Overview – Goods Movement Infrastructure and Traffic Flows

- **Trucks**
- **Rail Lines**
- **Marine Ports**
- **Air Ports**

4. Goods Movement Infrastructure and Traffic

Trucks

- **Truck Routes and Inspection Facilities**
- **Truck Traffic (Bay Area and National)**
- **Caltrans Truck Survey Results**
- **Performance (Vehicle Volumes to Roadway Capacity (V/C) ratios and Accidents))**
- **Operations (Time of day with and without Autos, Seasonal)**
- **Freight Facilities**

Truck Routes and Inspection Facilities

Truck routes are designated by Caltrans for the state highway facilities and by the cities in the Bay Area. Caltrans have four primary categories of truck routes:

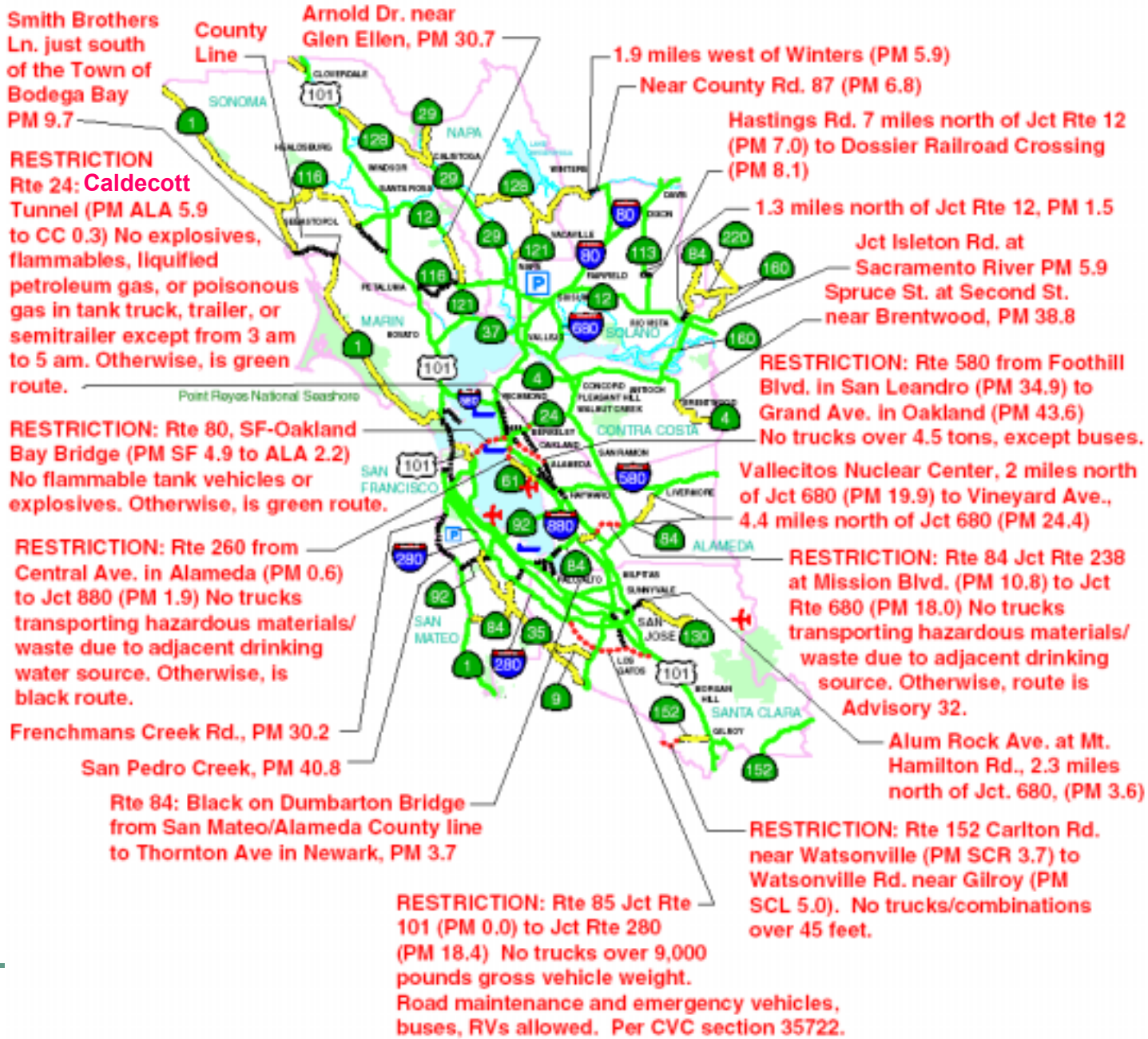
- Surface Transportation Assistance Act (STAA) Routes and Terminal Access Routes – STAA routes are part of a national network and allow tractor-semis more than 65 feet in length or with more than 40 feet kingpin-rear axle length up to the legal weight limits for the state. Terminal access routes provide STAA trucks with legal access to and from the STAA network and major truck terminal concentrations.
- California Legal Routes – Routes where it is legal for tractor-semis with an overall length up to 65 feet and 40 feet kingpin-rear axle length to travel.
- King Pin-Rear Axle Advisory Routes – Routes where the state advises against travel by tractor-semis with kingpin-rear axle length over the posted value.
- Routes with Operational Restrictions

The state highway routing system includes a number of operating restrictions across the Bay and on a number of east-west corridors that tend to contribute to the creation of primary truck routing corridors as described later in this report.

The state also operates a number of weigh stations and safety inspection facilities to ensure safe operations of trucks and to protect the highways from overweight operations

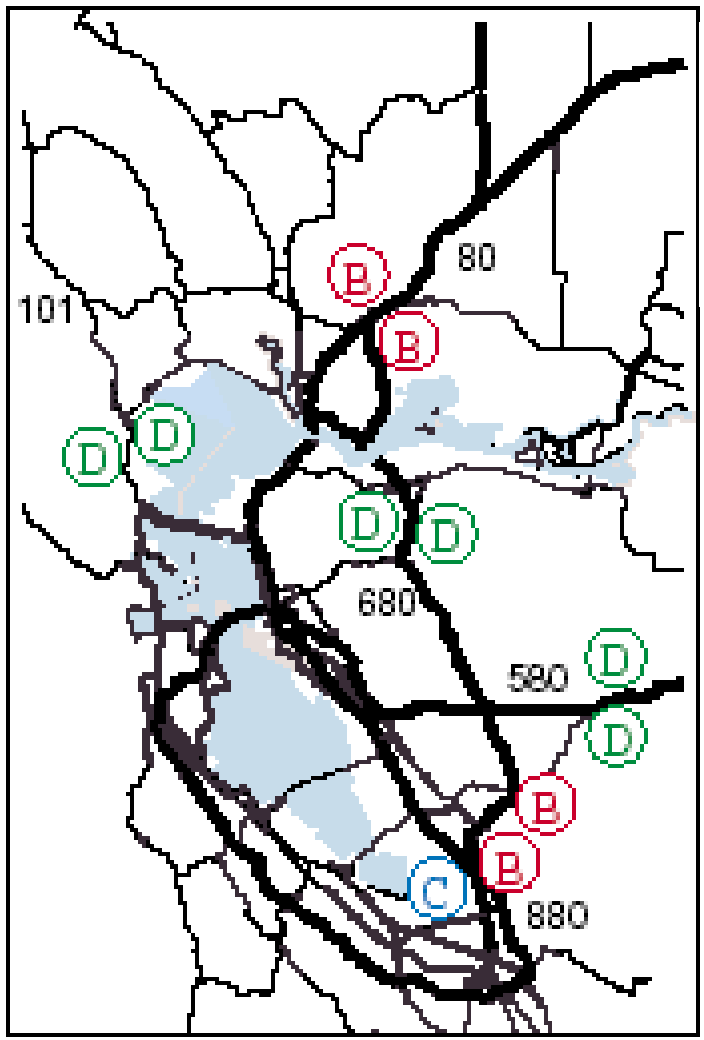
City truck route designations tend to be made to help direct truck traffic rather than to restrict it to prescribed roadways. In most cases, the truck routes link the state highway network to major areas of truck activity. Poor signage and infrequent review of connectivity to growing truck destinations and of routes across jurisdictions is a truck route problem that needs further attention.

Truck Routes



Source: CALTRANS

Commercial Vehicle Enforcement Facilities



CLASS

- Ⓐ Port of Entry Inspection Facility
- Ⓑ Inspection Facility
- Ⓒ Platform Scale with Racetrack
- Ⓓ Platform Scale no Racetrack

Note: Racetrack refers to a configuration of enforcement facility where inspection activities occur in the infield of an oblong roadway.

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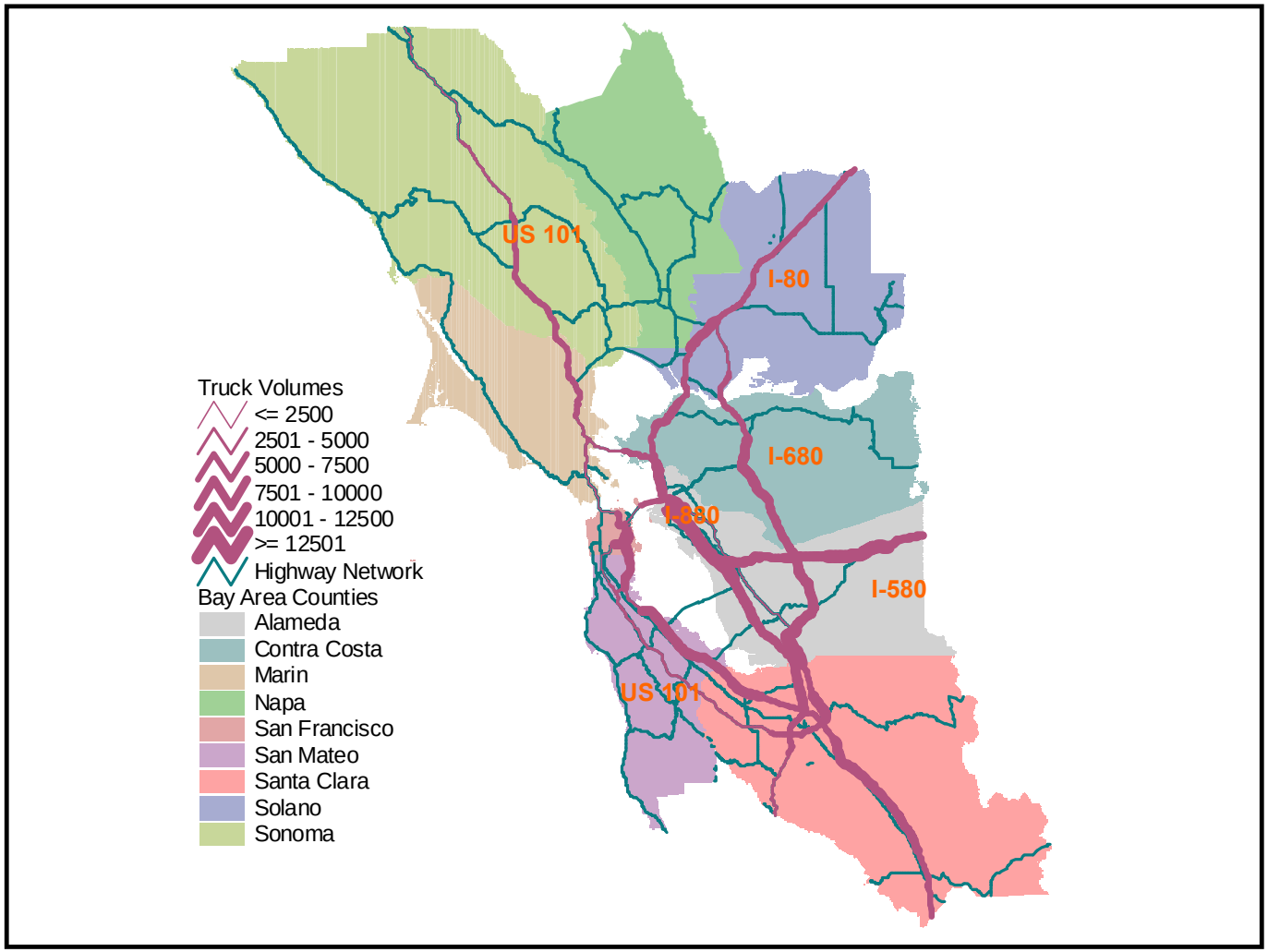
Truck Traffic on Major State Highways

The largest share of commodity trade in the Bay Area occurs by truck and the largest share of this trucking trade occurs intra-regionally. Excluding oil shipments by tanker from Alaska, this pattern is even more pronounced. Looking more carefully at this intra-regional truck movement, it is clear that a major goods movement corridor links Contra Costa, Alameda, and Santa Clara Counties. These counties also show strong trade links with Sacramento and the northern San Joaquin Valley, particularly with San Joaquin County.

There are four primary truck corridors in the Bay Area and each serves slightly different functions. U.S. 101 acts as a gateway corridor to the south of the region with modest truck volumes (5000-9500 trucks per day) and a high percentage of 5+ axle trucks (over 55%) from Salinas into San Jose. Truck volumes increase substantially from San Jose north into San Francisco, where the corridor serves the international airports and intra-regional traffic with a higher fraction of 2-axle trucks (generally 50-60% of total truck traffic). I-80 serves primarily as a gateway corridor north of SR-4 through Solano County (10,000 -12,000 trucks per day of which over 55% are 5+ axle trucks). I-580 is also primarily a gateway corridor serving as the principal link between the Bay Area and I-5. Truck volumes are near or above 15,000 trucks per day of which 75-80% are 5+ axle trucks. I-880 carries the highest volume of truck traffic in the Bay Area with 16,000-20,000 trucks per day north of SR-238. Serving both the Port of Oakland, Oakland International Airport, and the Oakland Intermodal Gateway Terminal as well as industrial and warehouse land uses in the south end of the corridor, I-880 serves as both an access route for major inter-regional shippers and a primary inter-regional corridor. The majority of truck traffic on I-880 is 5+ axle traffic but there is also a very high percentage of local 2-axle trucks (typically 30-40% of total truck traffic). I-680 does not yet have the volumes of truck traffic that the four primary corridors have, but it is growing as an intra-regional trade corridor in the East Bay.

Truck Traffic on Major State Highways



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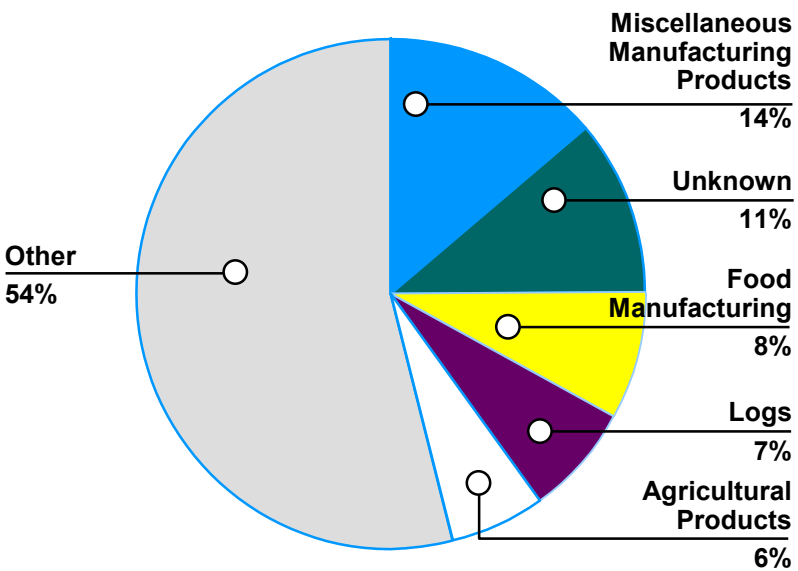
Most Bay Area Truck Moves Stay in CA

Source: FHWA Freight Analysis Framework

I-80 Solano County in Cordelia

Caltrans Truck Survey Summary

Location	Dir		ALA	CC	MRN	NAP	SF	SCL	SM	SOL	SON	Other	Total
I-80 Solano	EB	Origin	35%	17%	3%	6%	4%	6%	1%	16%	12%	1%	100%
		Destination	0%	0%	0%	0%	0%	0%	0%	25%	0%	75%	100%
I-80 Solano	WB	Origin	2%	0%	1%	1%	0%	0%	0%	15%	0%	81%	100%
		Destination	26%	17%	0%	6%	6%	9%	6%	17%	10%	3%	100%



Average Distance Between Stops*	140 miles (EB)	123 miles (WB)
Average Stops* Per Day	4.2 stops (EB)	5.3 stops (WB)
Average Miles Driven Day of Survey	357 miles (EB)	352 miles (WB)

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I-80 Solano County in Cordelia

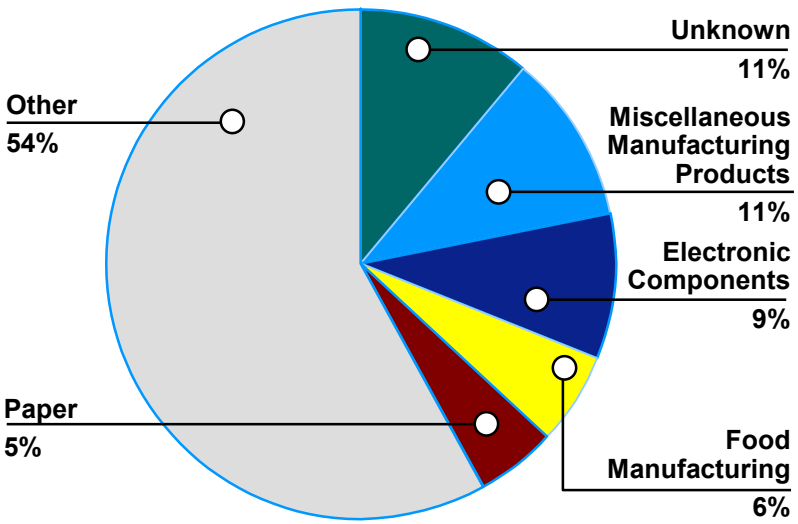
Caltrans Truck Survey Summary

Eastbound		Westbound	
Origin Facility	Percent	Origin Facility	Percent
Distribution Center	20%	Distribution Center	31%
Manufacturing Facility	18%	Truckstop/Rest Area/Motel	17%
Retail Store	16%	Manufacturing Facility	11%
Truck Terminal/Reload Facility	11%	Truck Terminal/Reload Facility	10%
Wholesale Location	6%	Retail Store	7%
Other	30%	Other	24%
Total	100%	Total	100%
Eastbound		**Westbound**	
Destination Facility	Percent	Destination Facility	Percent
Truck Terminal/Reload Facility	17%	Retail Store	20%
Manufacturing Facility	14%	Distribution Center	17%
Retail Store	12%	Truck Terminal/Reload Facility	14%
Distribution Center	11%	Manufacturing Facility	13%
Other	47%	Residential Location	7%
		Other	29%
Total	100%	Total	100%

I-880 Alameda County - Nimitz Freeway

Caltrans Truck Survey Summary

				Origin County										
Location			Dir	ALA	CC	MRN	NAP	SF	SCL	SM	SOL	SON	Other	Total
I-880		Origin Facility	NB	12%	0%	0%	0%	0%	70%	1%	0%	0%	17%	100%
		Destination Facility		87%	5%	2%	0%	1%	0%	1%	1%	1%	3%	100%
I-880		Origin Facility	SB	79%	9%	1%	0%	4%	2%	0%	2%	0%	4%	100%
		Destination Facility		11%	0%	0%	0%	67%	0%	0%	0%	0%	22%	100%



Average Distance Between Stops*	50 miles (NB)	70 miles (SB)
Average Stops* Per Day	6.9 stops (NB)	5.6 stops (SB)
Average Miles Driven Day of Survey	182 miles (NB)	184 miles (SB)

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I-880 Alameda County - Nimitz Freeway

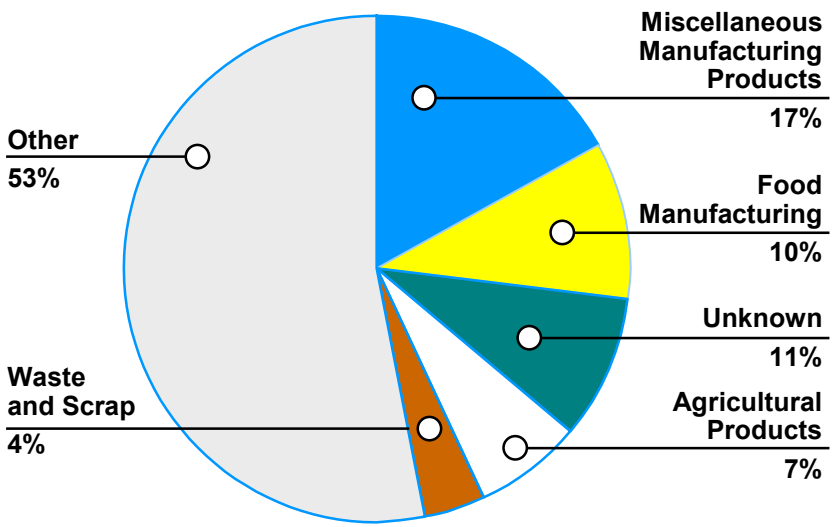
Caltrans Truck Survey Summary

Northbound		Southbound	
Origin Facility	Percent	Origin Facility	Percent
Distribution Center	32%	Distribution Center	48%
Manufacturing Facility	21%	Retail store	14%
Retail store	17%	Manufacturing Facility	14%
Truck Terminal/Reload Facility	7%	Truck Terminal/Reload Facility	10%
Other	24%	Other	13%
Total	100%	Total	100%
Northbound		Southbound	
Destination Facility	Percent	Destination Facility	Percent
Distribution Center	24%	Distribution Center	20%
Truck Terminal/Reload Facility	19%	Retail Store	20%
Retail store	13%	Manufacturing Facility	15%
Manufacturing Facility	12%	Truck Terminal/Reload Facility	14%
Other	31%	Other	30%
Total	100%	Total	100%

I-580 Alameda County in Livermore

Caltrans Truck Survey Summary

Location	Dir		ALA	CC	MRN	NAP	SF	SCL	SM	SOL	SON	Other	Total
I-580 Livermore	EB	Origin Facility	67%	7%	0%	1%	8%	0%	6%	2%	2%	7%	100%
		Destination Facility	5%	0%	0%	0%	0%	0%	0%	0%	0%	95%	100%
I-580 Livermore	WB	Origin Facility	2%	1%	0%	0%	0%	0%	0%	0%	0%	97%	100%
		Destination Facility	61%	7%	1%	1%	13%	4%	3%	2%	1%	8%	100%



Average Distance Between Stops*	167 miles (EB)	158 miles (WB)
Average Stops* Per Day	4.0 stops (EB)	3.9 stops (WB)
Average Miles Driven Day of Survey	325 miles (EB)	329 miles (WB)

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I-580 Alameda County in Livermore

Caltrans Truck Survey Summary

Eastbound	
Origin Facility	Percent
Distribution Center	28%
Manufacturing Facility	21%
Truck Terminal/Reload Facility	8%
Retail store	7%
Other	36%
Total	100%

Eastbound	
Origin Facility	Percent
Distribution Center	21%
Truck Terminal/Reload Facility	15%
Truckstop/Rest Area/Motel	13%
Manufacturing Facility	12%
Other	39%
Total	100%

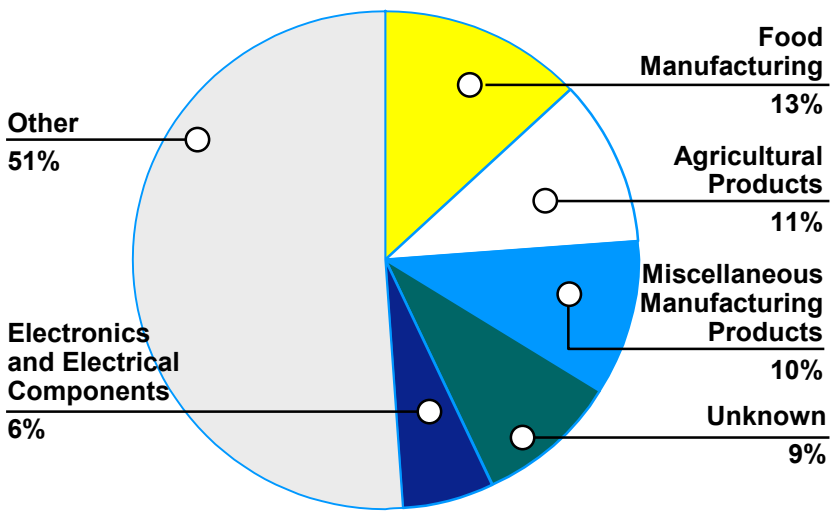
Eastbound	
Destination Facility	Percent
Distribution Center	24%
Truck Terminal/Reload Facility	15%
Manufacturing Facility	11%
Truckstop/Rest Area/Motel	11%
Other	39%
Total	100%

Eastbound	
Destination Facility	Percent
Distribution Center	19%
Retail Store	16%
Marine Port	14%
Truck Terminal/Reload Facility	10%
Other	41%
Total	100%

Highway 101, Santa Clara County in Gilroy

Caltrans Truck Survey Summary

Location	Dir		Origin County										
			ALA	CC	MRN	NAP	SF	SCL	SM	SOL	SON	Other	Total
Hwy 101 Santa Clara	NB	Origin Facility	20%	1%	1%	1%	4%	58%	6%	2%	1%	5%	100%
		Destination Facility	0%	0%	0%	0%	23%	0%	1%	0%	0%	76%	100%
Hwy 101 Santa Clara	SB	Origin Facility	0%	0%	0%	0%	17%	0%	0%	0%	0%	83%	100%
		Destination Facility	25%	2%	0%	1%	2%	57%	3%	2%	2%	6%	100%



Average Distance Between Stops*	139 miles (NB)	128 miles (SB)
Average Stops* Per Day	4.9 stops (NB)	4.9 stops (SB)
Average Miles Driven Day of Survey	324 miles (NB)	307 miles (SB)

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Highway 101 Santa Clara County in Gilroy

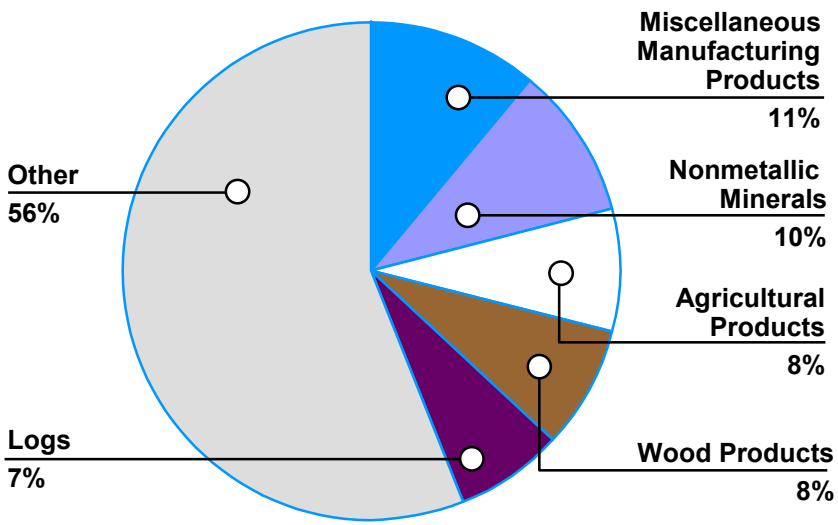
Caltrans Truck Survey Summary

Northbound		Southbound	
Origin Facility	Percent	Origin Facility	Percent
Distribution Center	22%	Distribution Center	31%
Truckstop/Rest Area/Motel	17%	Manufacturing Facility	20%
Retail store	16%	Retail store	11%
Manufacturing Facility	12%	Public/Gov't Location	7%
Other	33%	Other	31%
Total	100%	Total	100%
Northbound		Southbound	
Destination Facility	Percent	Destination Facility	Percent
Distribution Center	28%	Distribution Center	27%
Manufacturing Facility	19%	Retail store	15%
Truck Terminal/Reload Facility	14%	Manufacturing Facility	9%
Retail store	11%	Truckstop/Rest Area/Motel	9%
Public/Government Location	6%	Other	40%
Other	22%	Total	100%
Total	100%		

Highway 101 Marin County in Terra Linda

Caltrans Truck Survey Summary

Location	Dir		ALA	CC	MRN	NAP	SF	SCL	SM	SOL	SON	Other	Total
Hwy 101 Marin	NB	Origin Facility	24%	9%	36%	0%	12%	9%	5%	0%	0%	4%	100%
		Destination Facility	0%	0%	30%	3%	0%	0%	1%	1%	52%	13%	100%
Hwy 101 Marin	SB	Origin Facility	0%	0%	14%	2%	0%	0%	0%	0%	76%	8%	100%
		Destination Facility	20%	12%	43%	0%	4%	6%	2%	0%	0%	14%	100%



Average Distance Between Stops*	74 miles (NB)	65 miles (SB)
Average Stops* Per Day	6.5 stops (NB)	5.8 stops (SB)
Average Miles Driven Day of Survey	186 miles (NB)	317 miles (SB)

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Highway 101 Marin County in Terra Linda

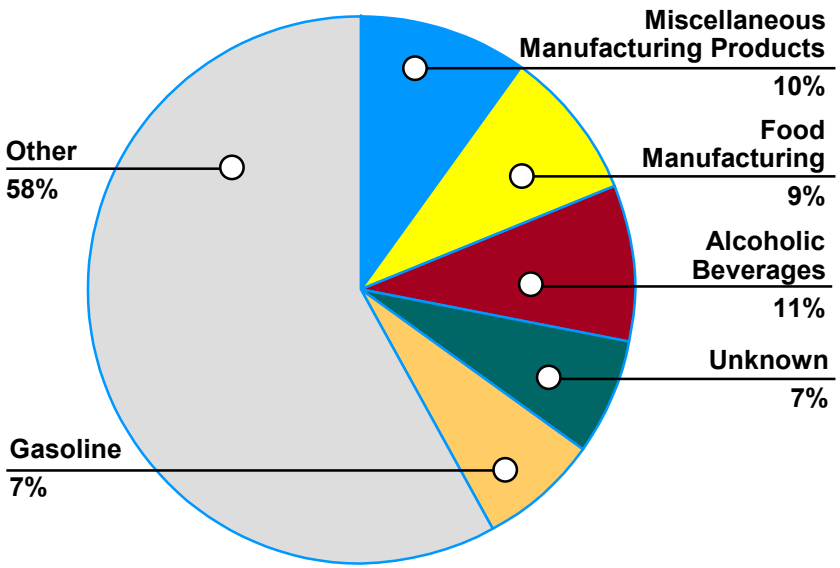
Caltrans Truck Survey Summary

Northbound		Southbound	
Origin Facility	Percent	Origin Facility	Percent
Distribution Center	21%	Retail Store	24%
Retail store	14%	Truck Terminal/Reload Facility	20%
Residential Location	12%	Distribution Center	16%
Manufacturing Facility	8%	Residential Location	8%
Other	45%	Other	32%
Total	100%	Total	100%
Northbound		Southbound	
Destination Facility	Percent	Destination Facility	Percent
Retail store	21%	Retail Store	16%
Residential Location	17%	Truck Terminal/Reload Facility	14%
Distribution Center	17%	Manufacturing Facility	14%
Manufacturing Facility	6%	Distribution Center	10%
Other	39%	Other	46%
Total	100%	Total	100%

I-680 Contra Costa County in Walnut Creek

Caltrans Truck Survey Summary

Location	Dir		ALA	CC	MRN	NAP	SF	SCL	SM	SOL	SON	Other	Total
I-680 Contra Costa	NB	Origin Facility	38%	19%	0%	0%	0%	17%	0%	0%	1%	25%	100%
		Destination Facility	3%	50%	0%	2%	0%	0%	1%	25%	3%	17%	100%
I-680 Contra Costa	SB	Origin Facility	1%	44%	1%	6%	0%	0%	0%	21%	6%	20%	100%
		Destination Facility	36%	12%	0%	0%	22%	0%	3%	0%	1%	27%	100%



Average Distance Between Stops*	104 miles (NB)	131 miles (SB)
Average Stops* Per Day	5.1 stops (NB)	4.8 stops (SB)
Average Miles Driven Day of Survey	249 miles (NB)	256 miles (SB)

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I-680 Contra Costa County in Walnut Creek

Caltrans Truck Survey Summary

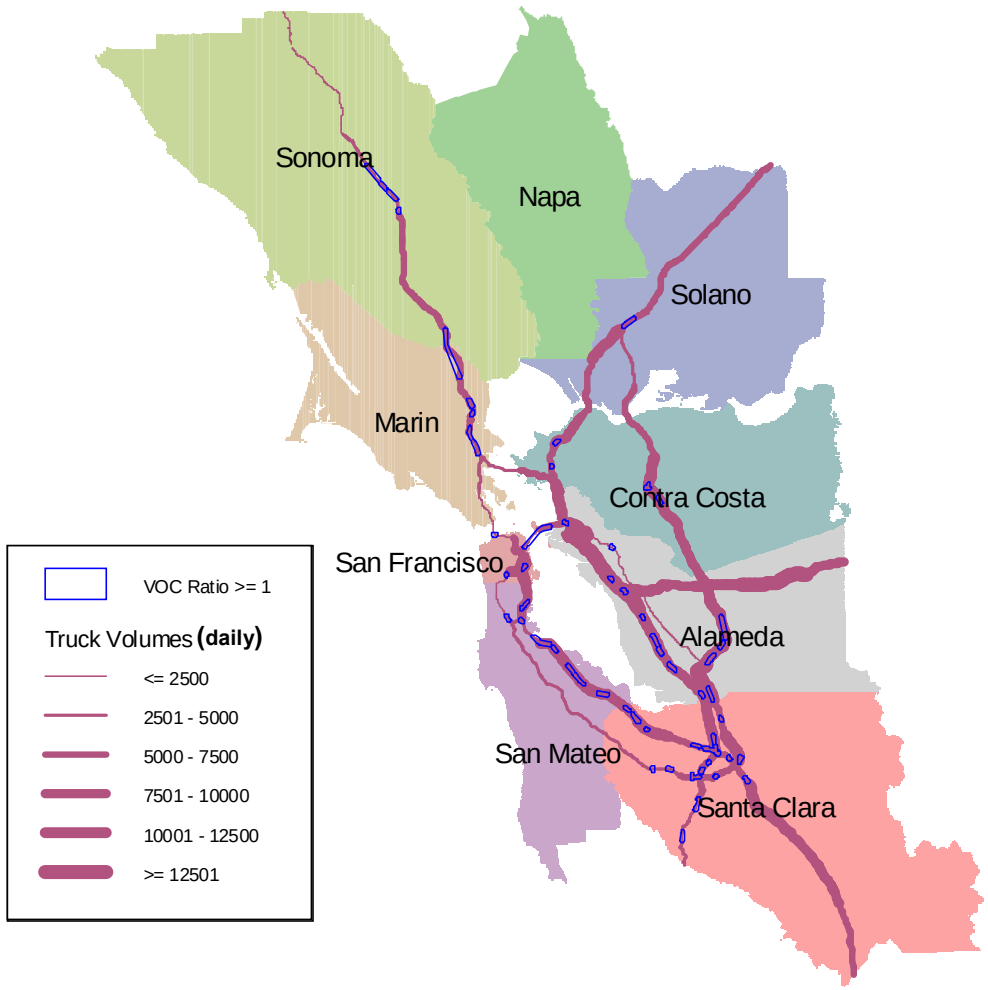
Northbound		Southbound	
Origin Facility	Percent	Origin Facility	Percent
Distribution Center	23%	Manufacturing Facility	34%
Manufacturing Facility	21%	Distribution Center	21%
Retail store	12%	Retail store	13%
Truck Terminal/Reload Facility	7%	Truck Terminal/Reload Facility	12%
Other	37%	Other	20%
Total	100%	Total	100%
Northbound		Southbound	
Destination Facility	Percent	Destination Facility	Percent
Distribution Center	22%	Truck Terminal/Reload Facility	22%
Truck Terminal/Reload Facility	21%	Retail Store	22%
Manufacturing Facility	15%	Manufacturing Facility	15%
Retail store	11%	Distribution Center	15%
Other	31%	Other	26%
Total	100%	Total	100%

Truck Traffic, Congestion, and Truck Accidents

Trucks generally avoid peak congestion periods with truck volume peaks typically occurring in late morning and mid-day. However, in a consumer-oriented economy like the Bay Area, a substantial amount of truck activity overlaps the morning peak period when deliveries are being made to retail and commercial centers. Significant truck-auto conflicts in congested corridors such as the U.S. 101 corridor on the Peninsula, I-80 through northern Alameda County, I-880 in the Fremont/Hayward area, and I-880/I-680 in the South Bay are a cause of concern.

I-880, U.S. 101, and I-580 are all routes with high truck volumes and numbers of truck-involved accidents. Operational improvements and incident management systems should receive priority in these corridors.

Truck Traffic and Congestion



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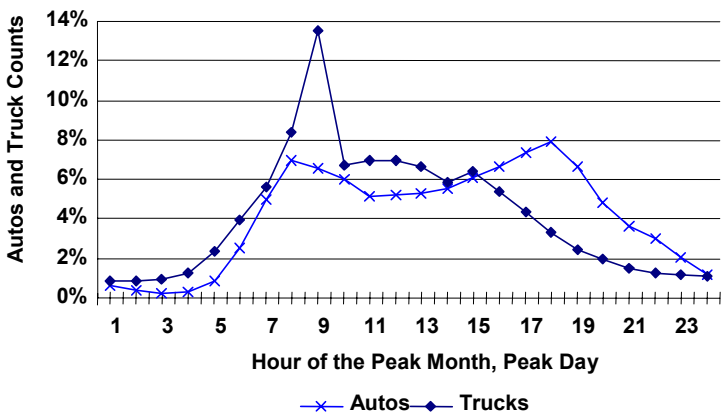
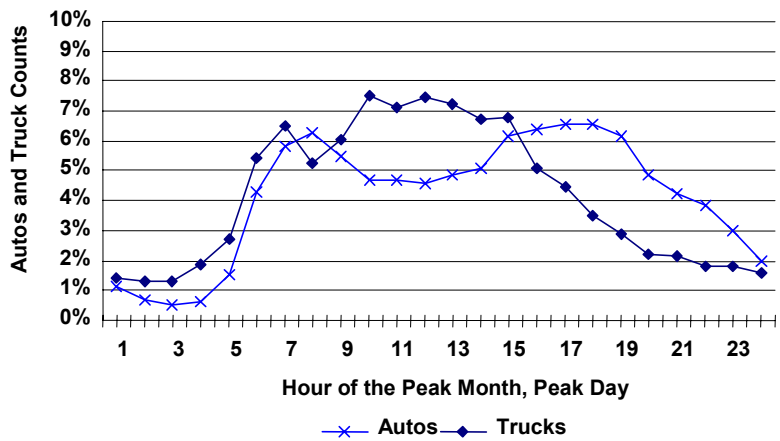
Growing Conflict Between Truck Traffic Patterns and Commuter Patterns

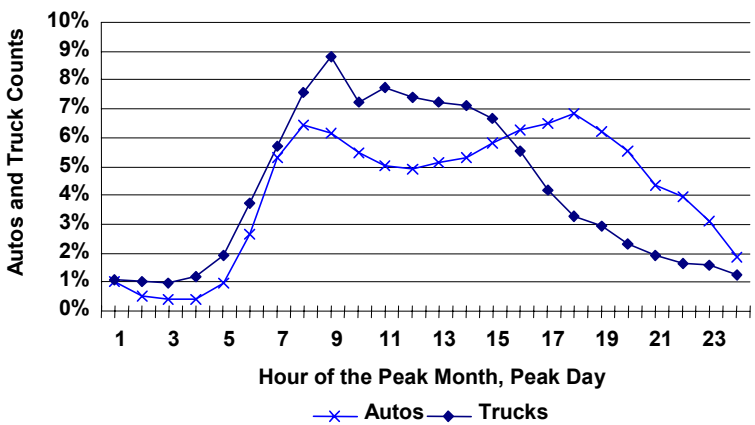
SOL – Hwy 80 in Cordelia



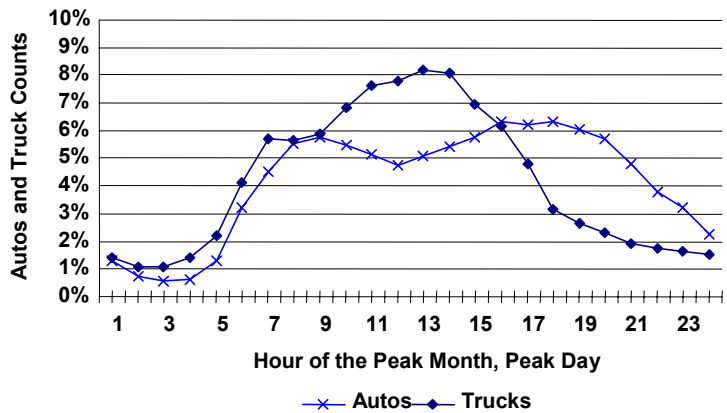
SCL – Hwy 101 in Gilroy



CC – Hwy 680 in Walnut Creek



ALA - Hwy 880 - Nimitz Freeway



Source: 2001-02 WIM Data.

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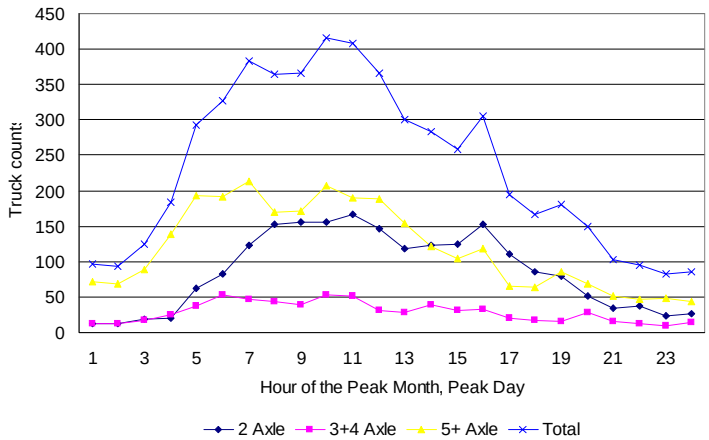
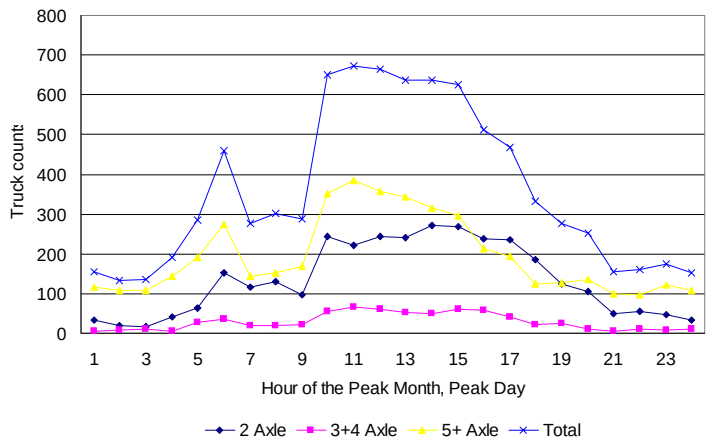
Hourly Truck Activity on Major Facilities

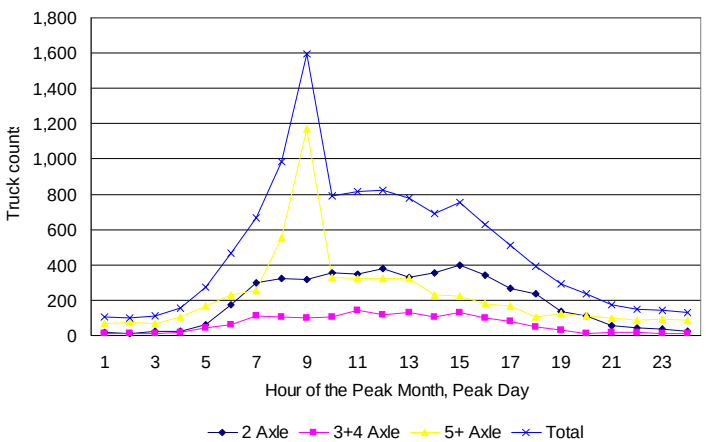
SOL - Hwy 80 in Cordelia



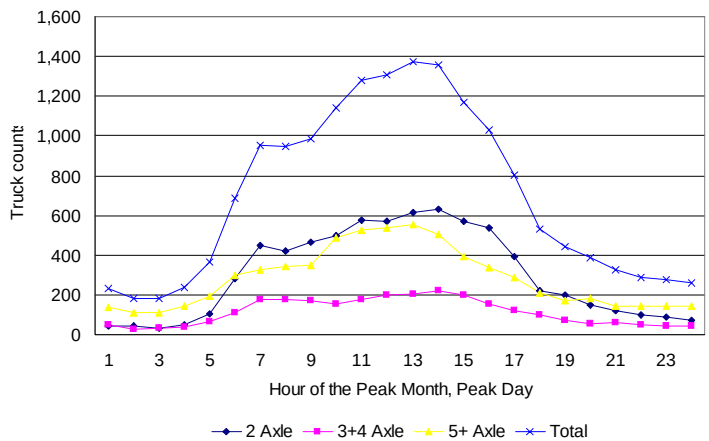
SCL - Hwy 101 in Gilroy



CC - Hwy 680 in Walnut Creek

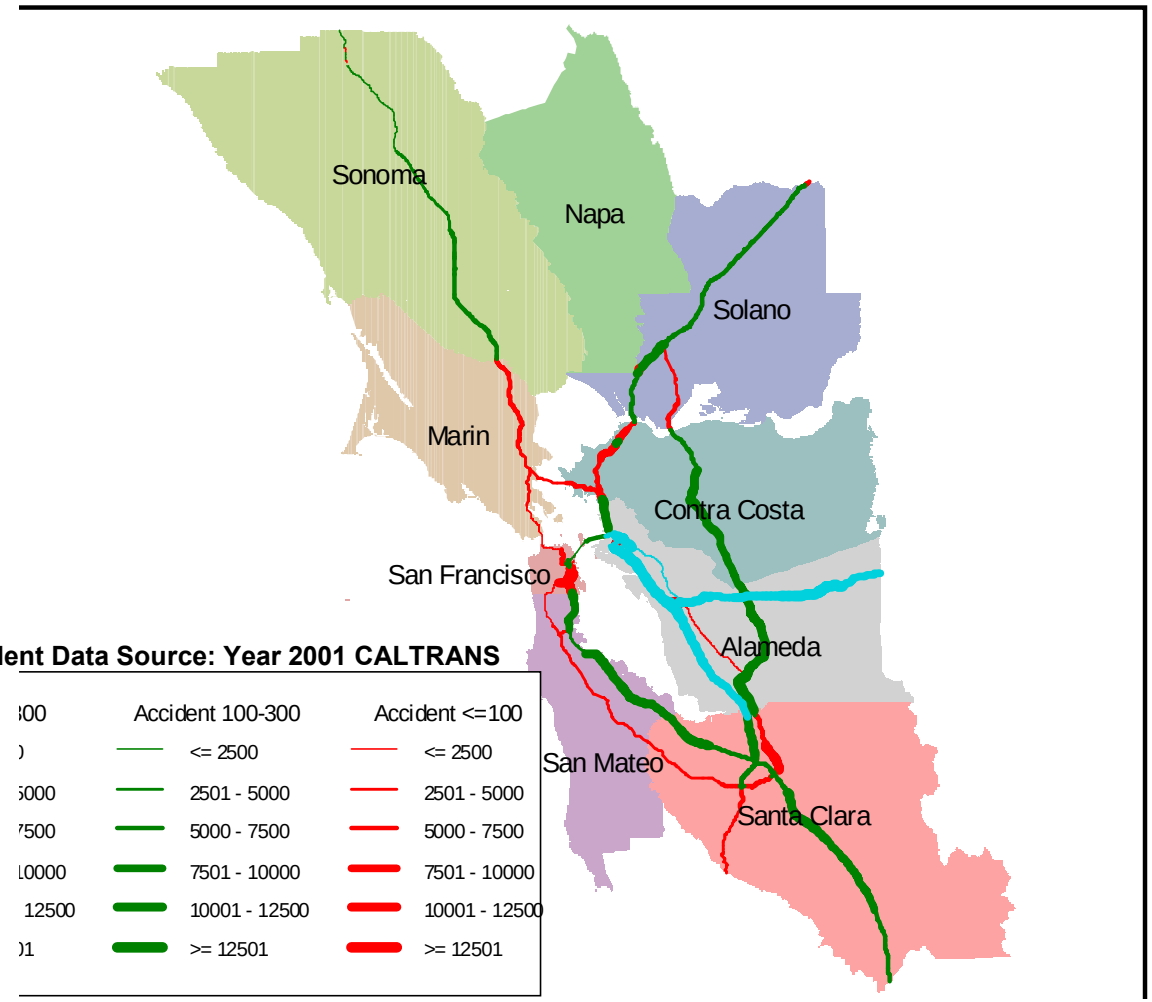


ALA - Hwy 880 - Nimitz Freeway



Daily Truck Traffic and Annual Truck Related Accidents

Truck Volume Extrapolated between Postmiles and Truck Related Highway Accidents



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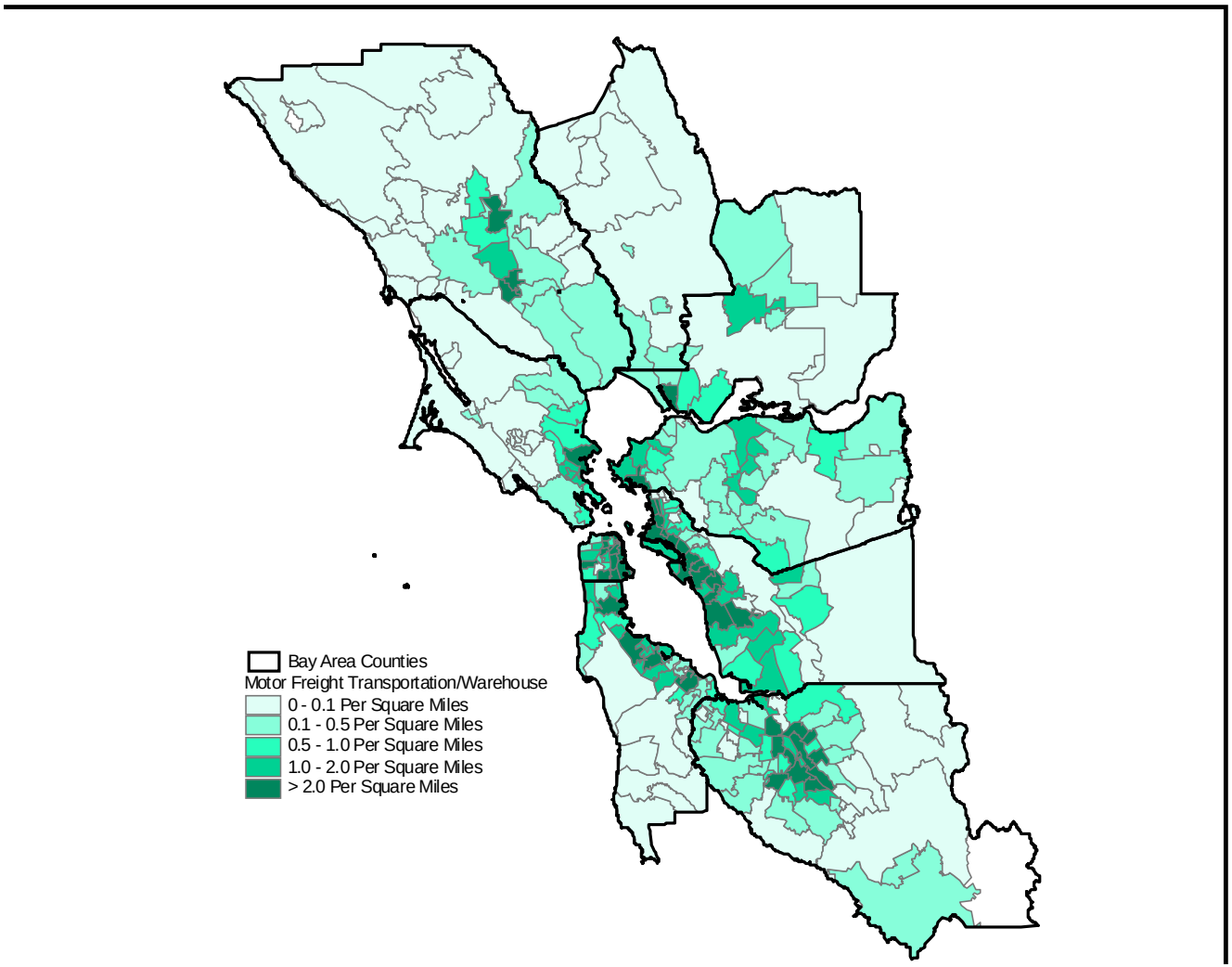
Concentrations of Truck-Oriented Businesses

The next series of slides shows the density of truck-oriented businesses in each Bay Area zip code. Truck-oriented business include: motor freight and public warehousing, transportation services, wholesale distribution, and manufacturing. As expected, these businesses tend to be concentrated in the major goods movement corridors in the region, primarily along the I-880 and U.S. 101 corridor. It should be noted that many of these businesses serve the consumer and service industry economy and not only the manufacturing base of the region. The consumer and service sectors in the region will continue to grow as will associated truck traffic. As real estate markets and land use plans evolve, the growth in these truck-oriented businesses will need to be accommodated.

Freight Facilities in Bay Area

- **Motor Freight Transportation/Warehouse**
- **Transportation Services**
- **Wholesale Trade**
  - **Durable Goods**
  - **Non-Durable Goods**
- **Manufacturing**
  - **Consumer Goods**
  - **Industrial Goods**
  - **Electronics, Electrical & Measuring Goods**

Distribution of Freight Facilities - Motor Freight Transportation/Warehouse



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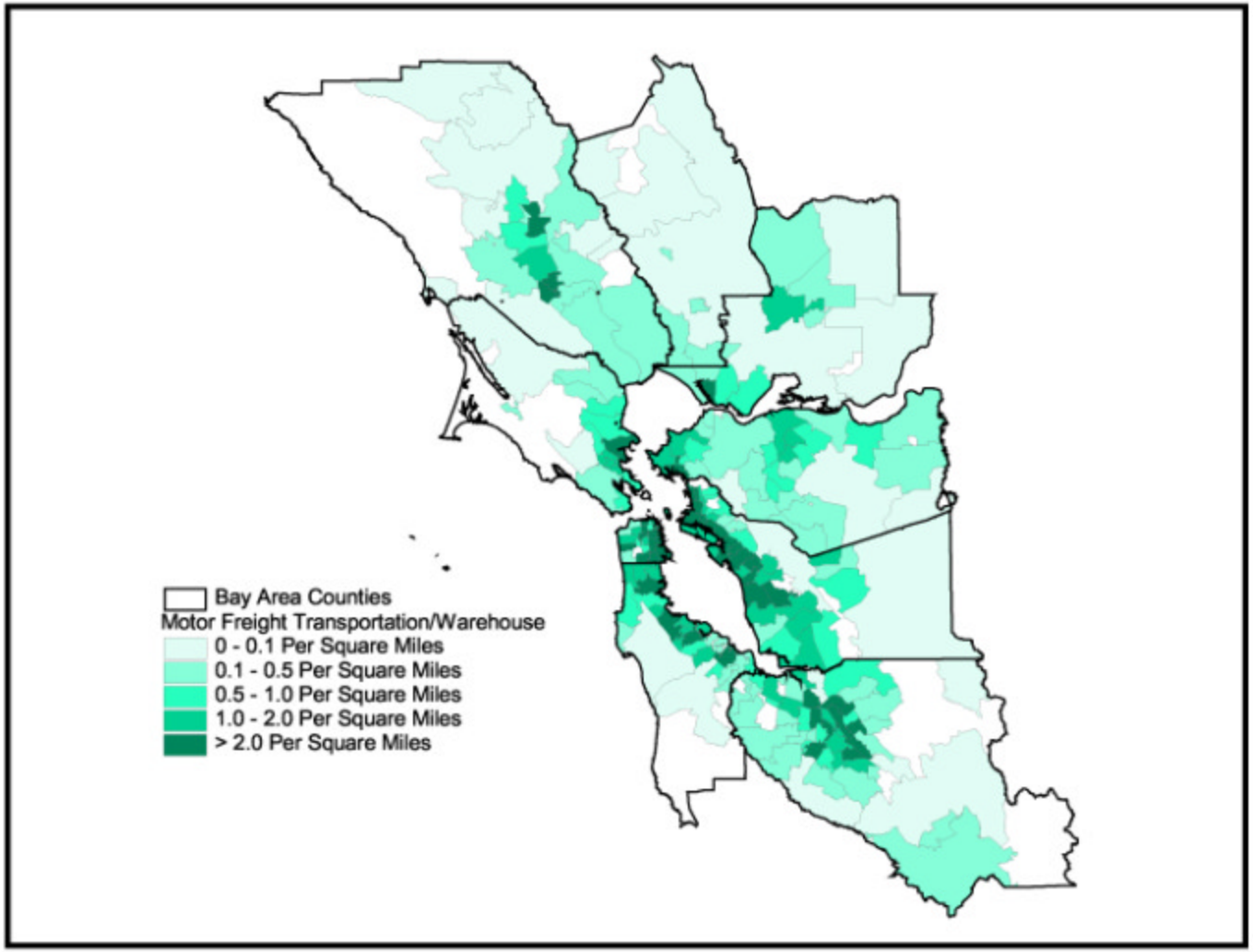
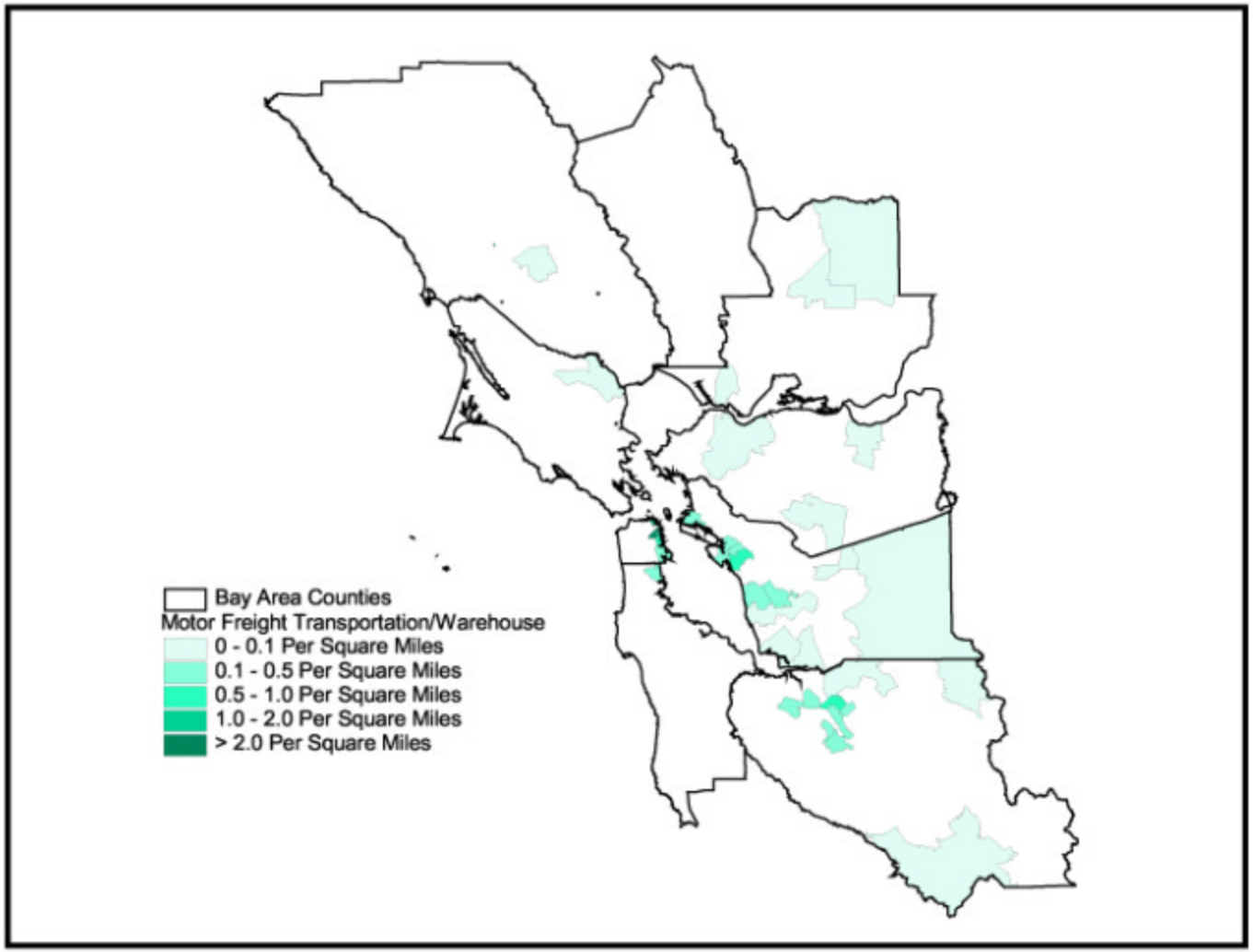
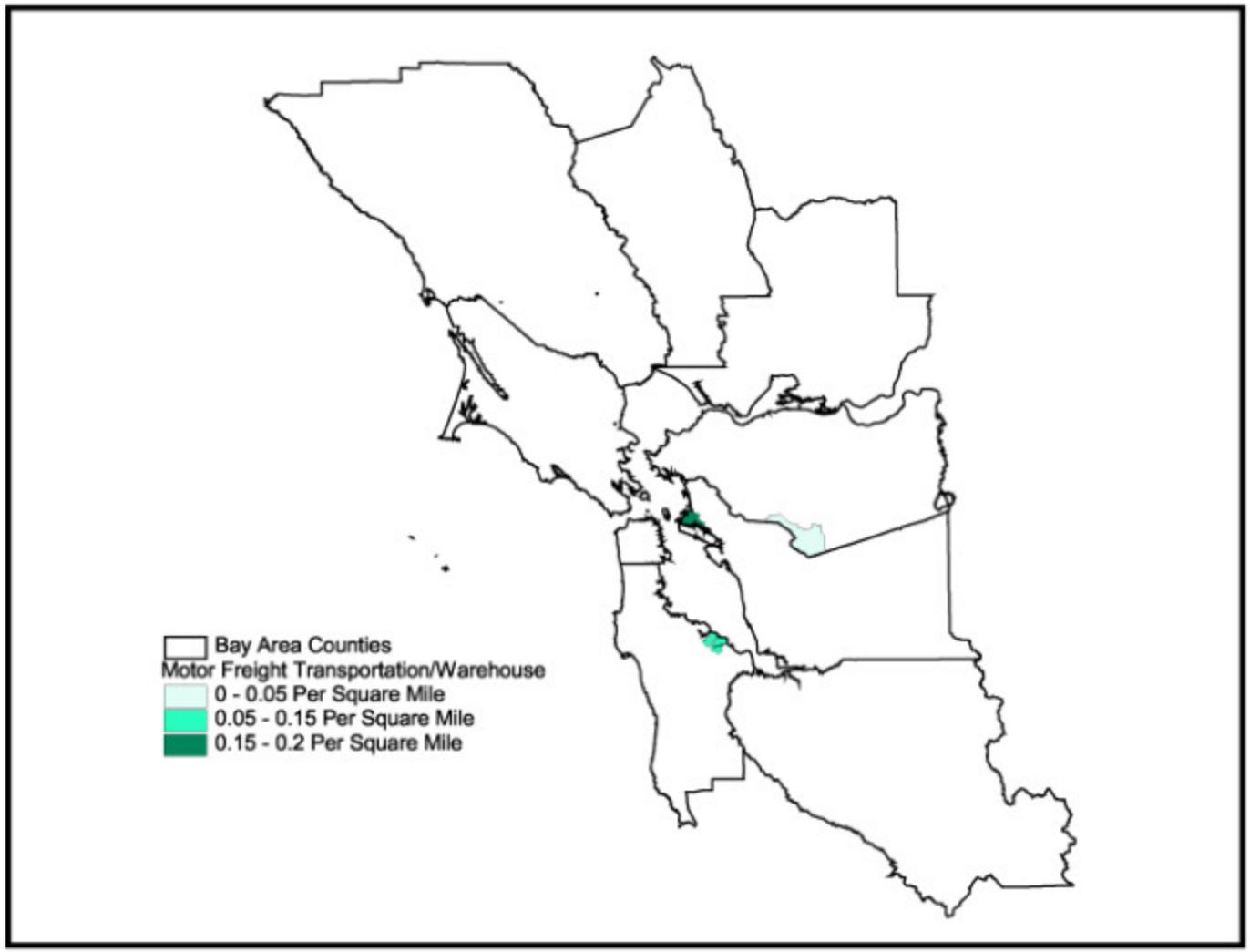
Distribution of Freight Facilities - Motor Freight Transportation/Warehouse (1 - 99 Employees)



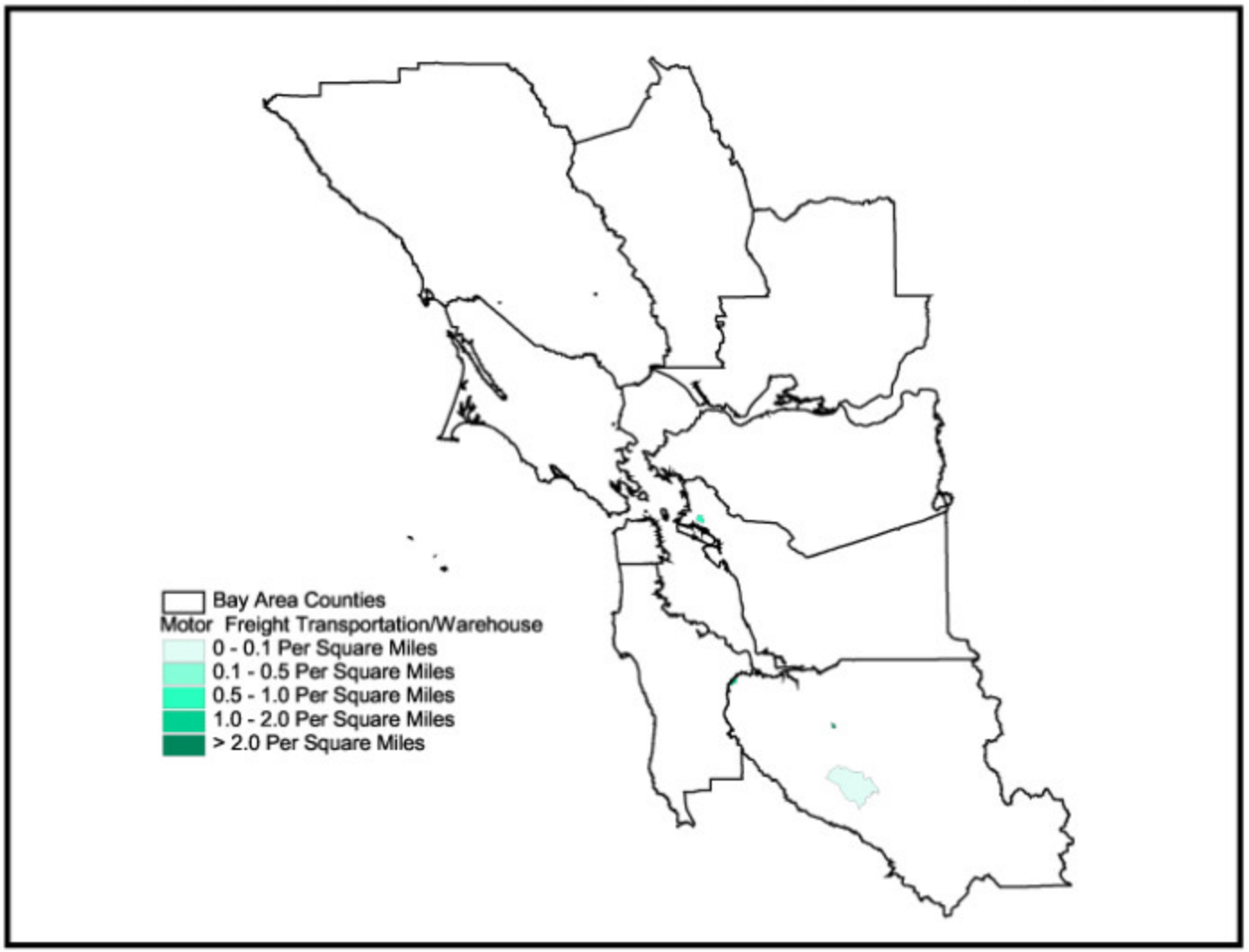
Distribution of Freight Facilities - Motor Freight Transportation/Warehouse (100 - 499 Employees)



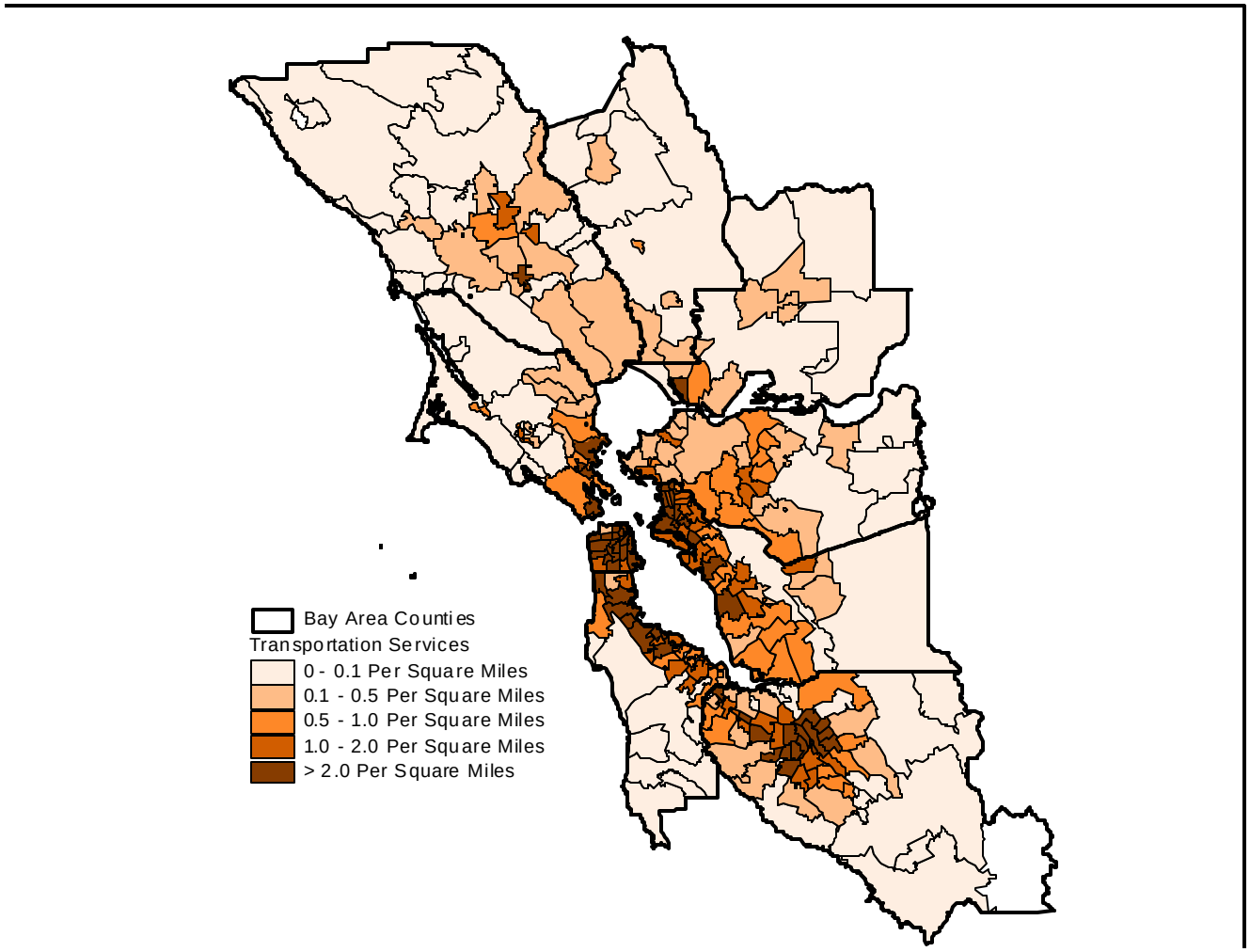
Distribution of Freight Facilities - Motor Freight Transportation/Warehouse (500 - 4,999 Employees)



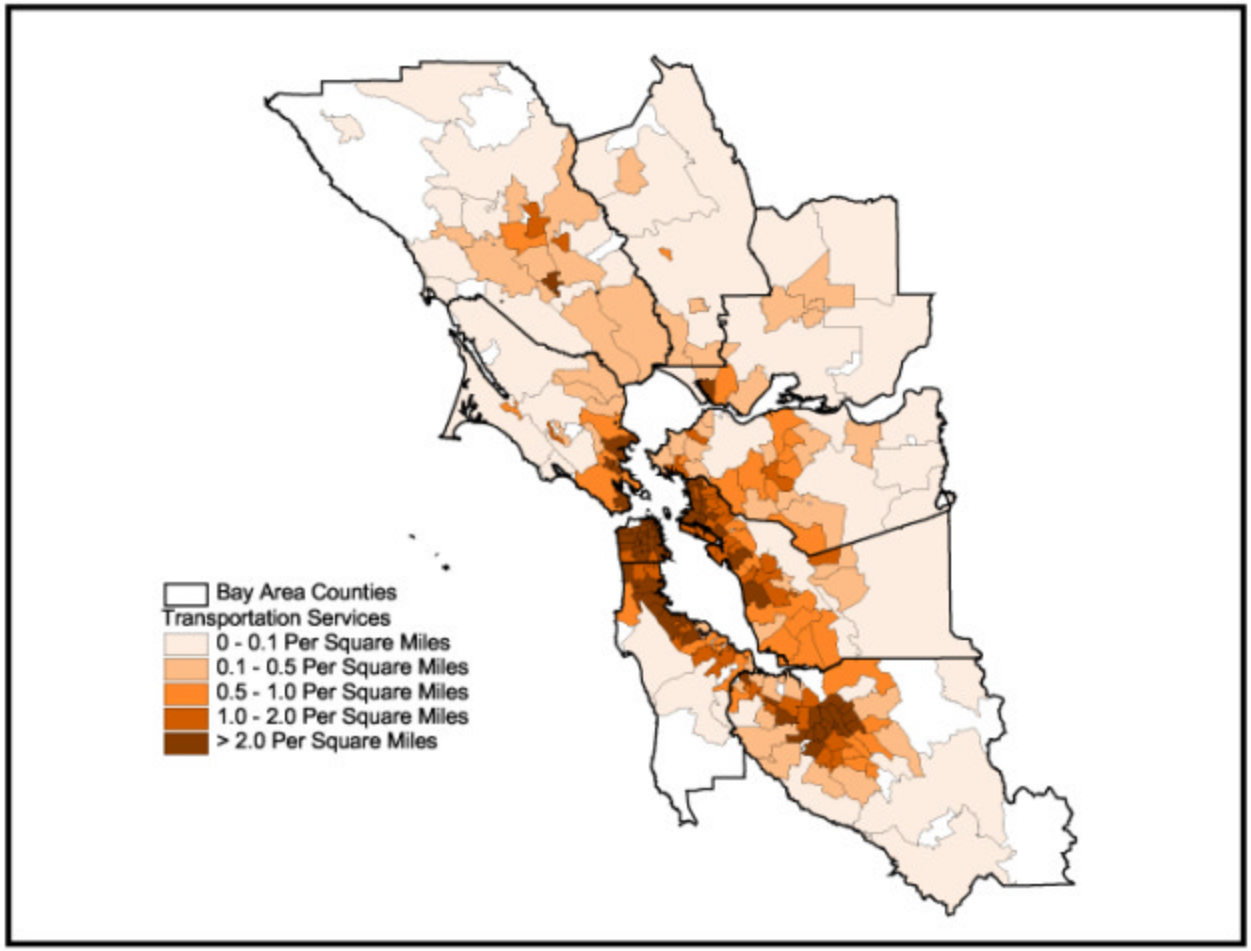
Distribution of Freight Facilities - Motor Freight Transportation/Wahrehouse (5,000 - 10,000 Employees)



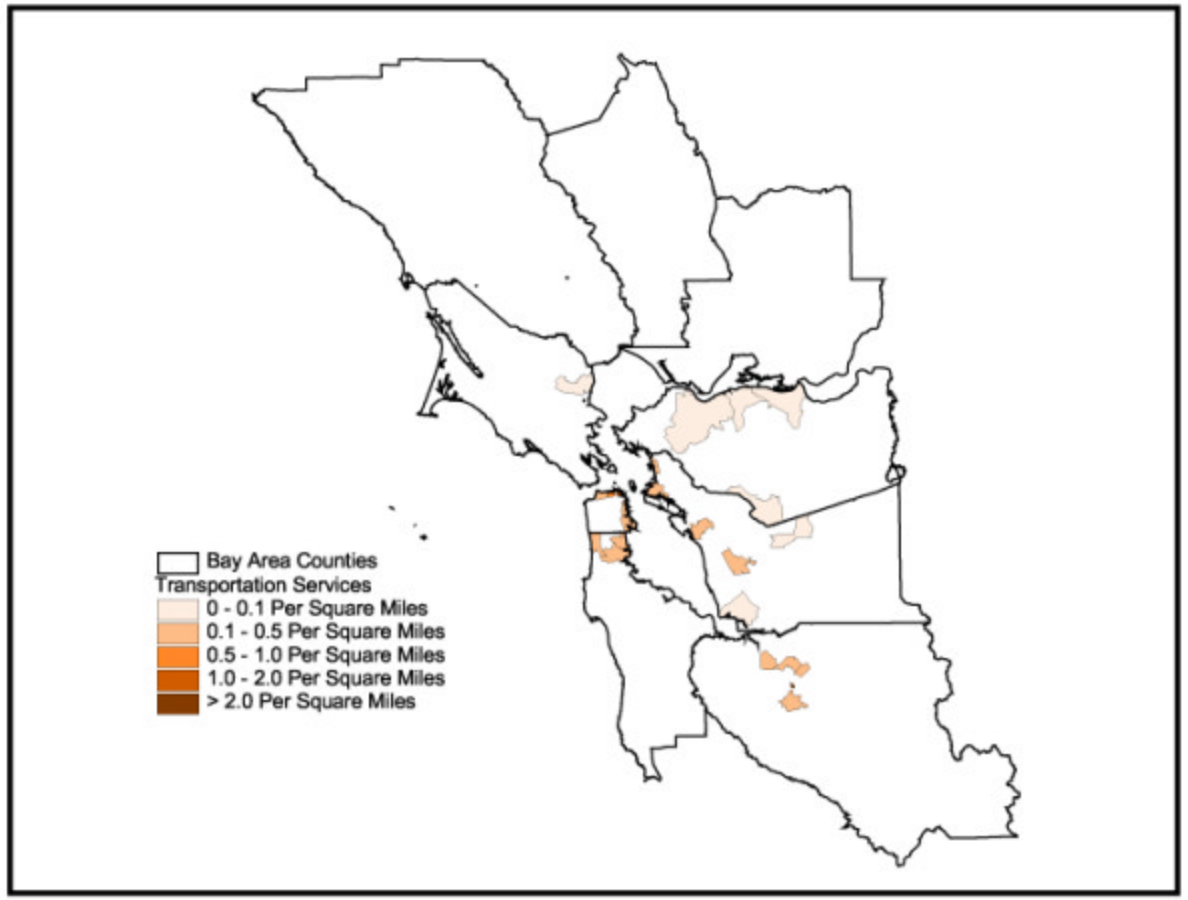
Distribution of Freight Facilities - Transportation Services



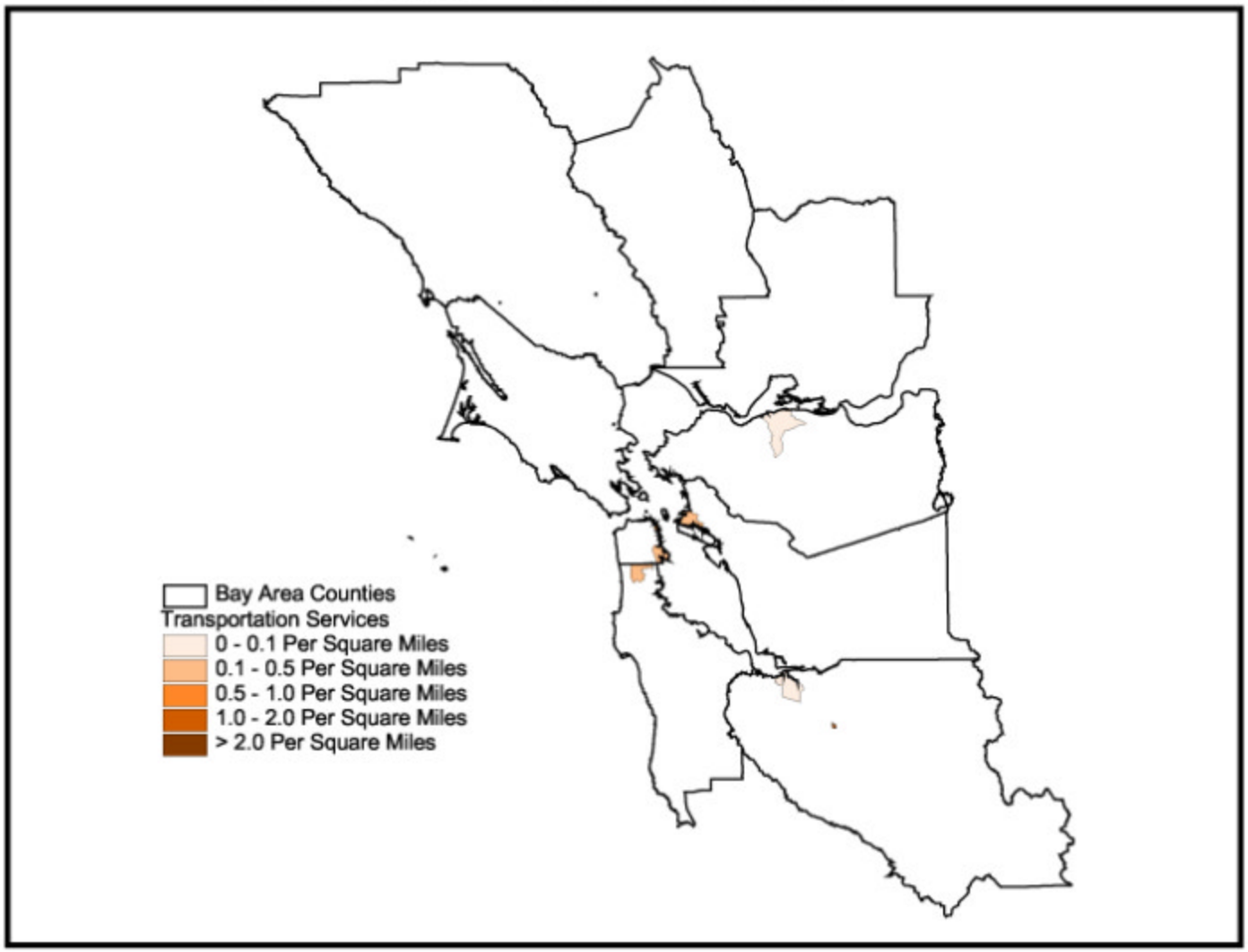
Distribution of Freight Facilities - Transportation Services (1 - 99 Employees)



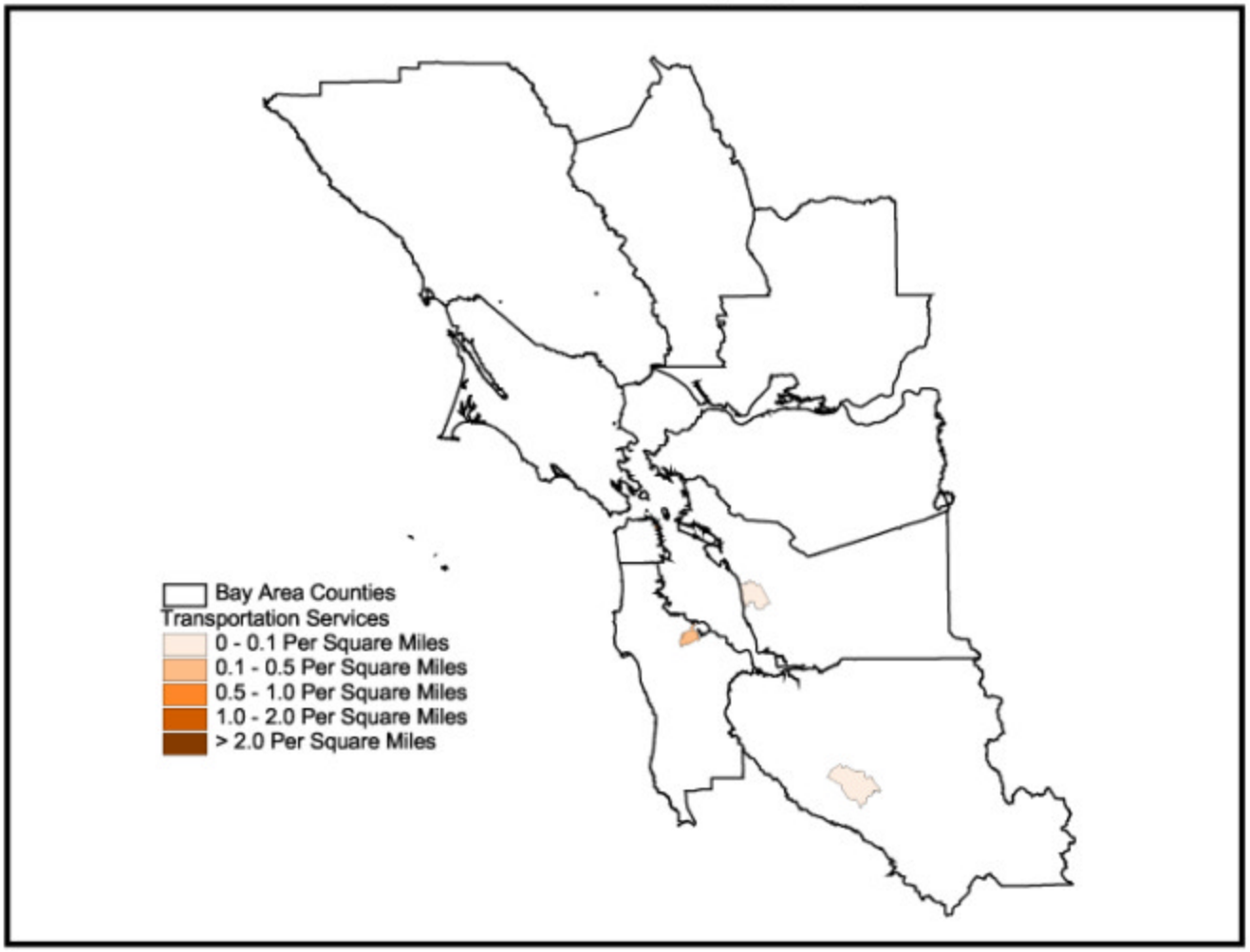
Distribution of Freight Facilities - Transportation Services (100 - 499 Employees)



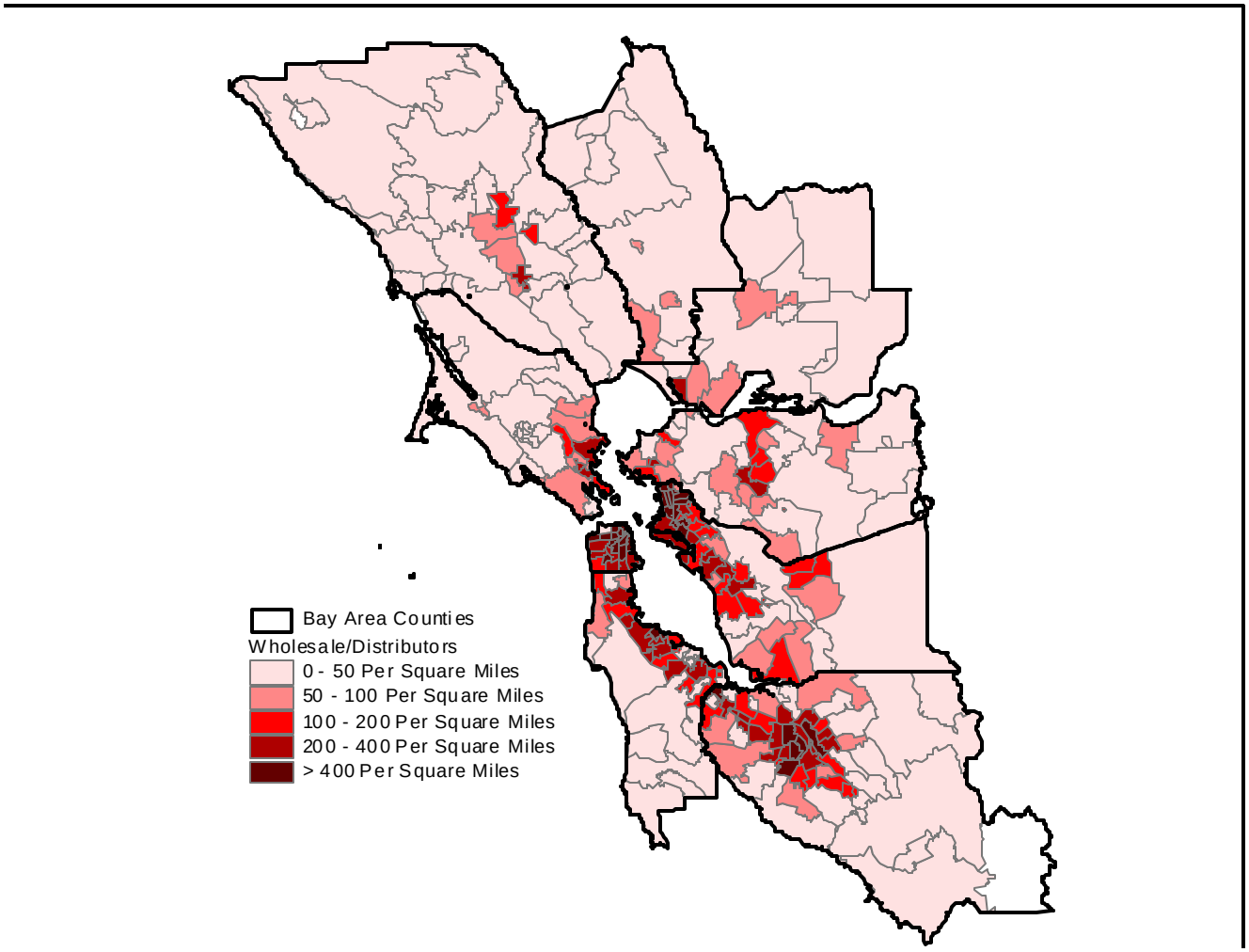
Distribution of Freight Facilities - Transportation Services (500 - 4,999 Employees)



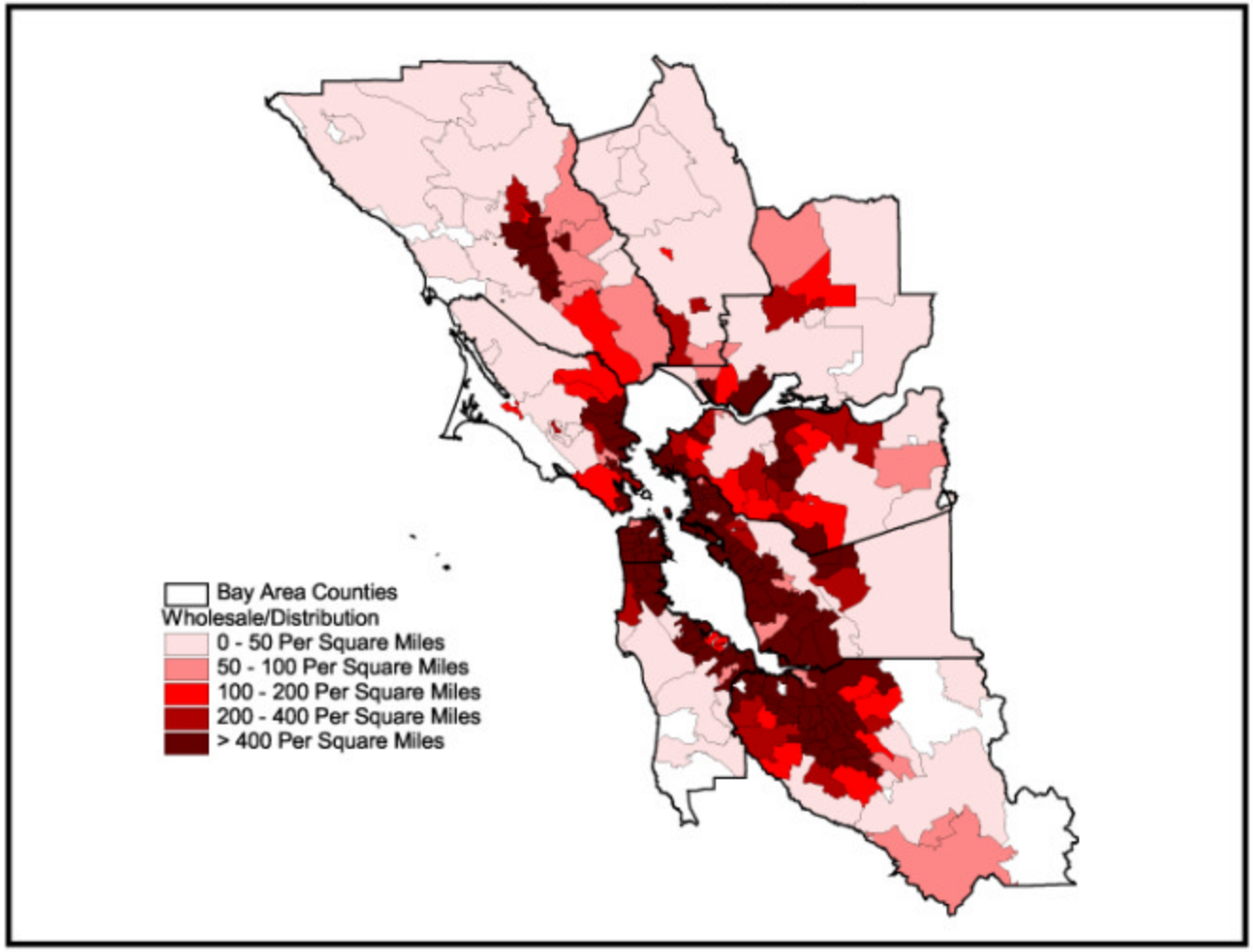
Distribution of Freight Facilities - Transportation Services (5,000 - 10,000 Employees)



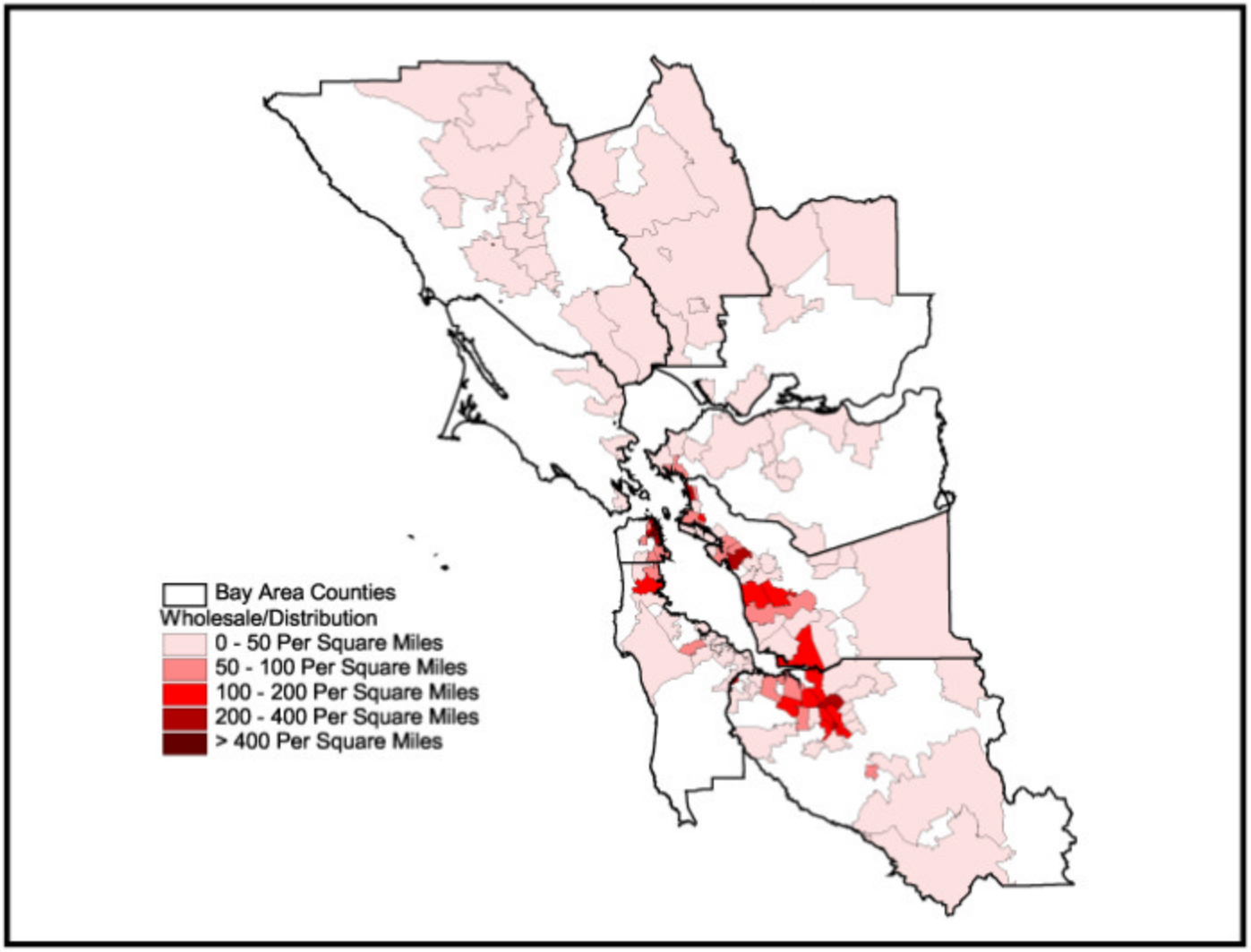
Distribution of Freight Facilities - Wholesale/Distributors



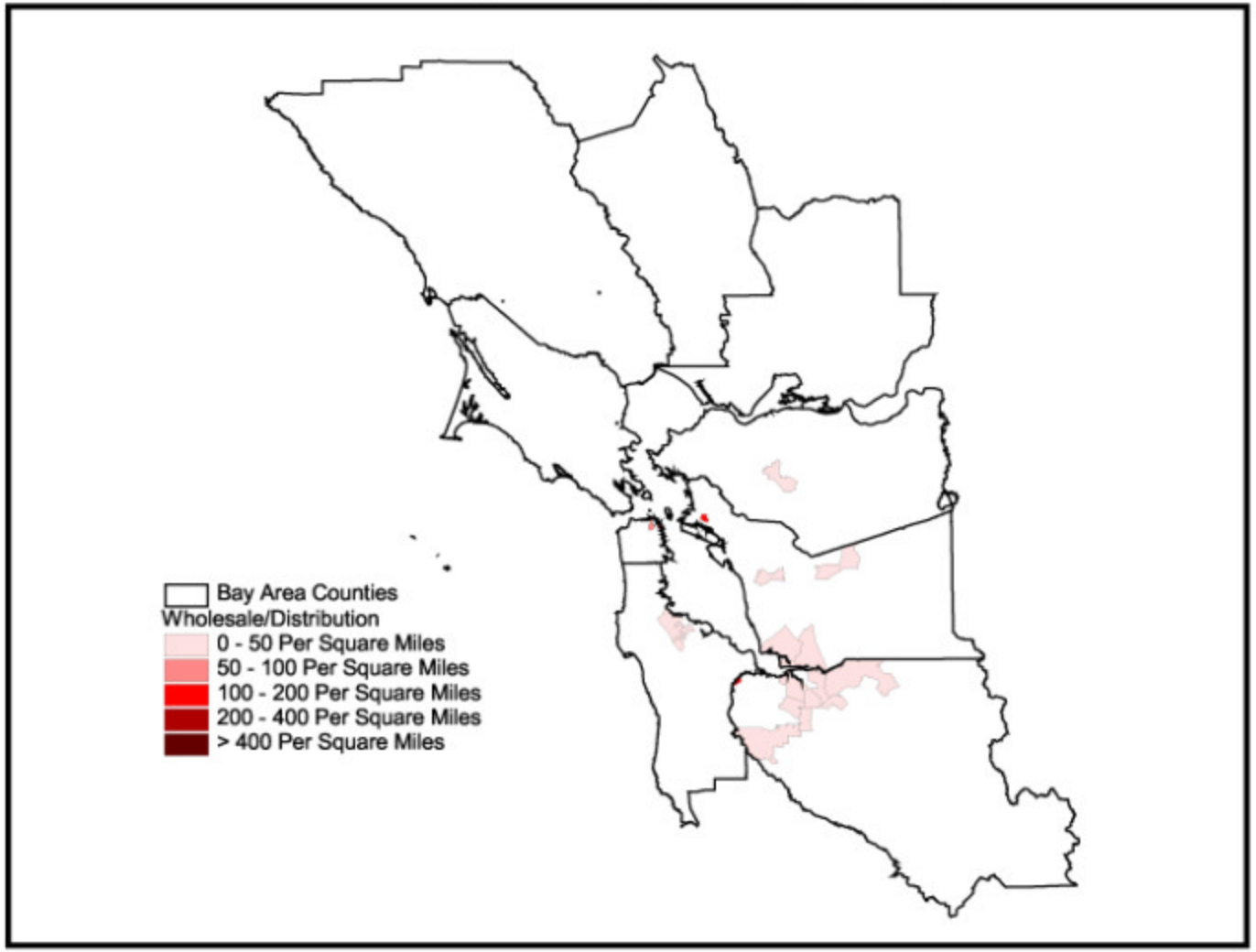
Distribution of Freight Facilities - Wholesale Trade Durable Goods (1 - 99 Employees)



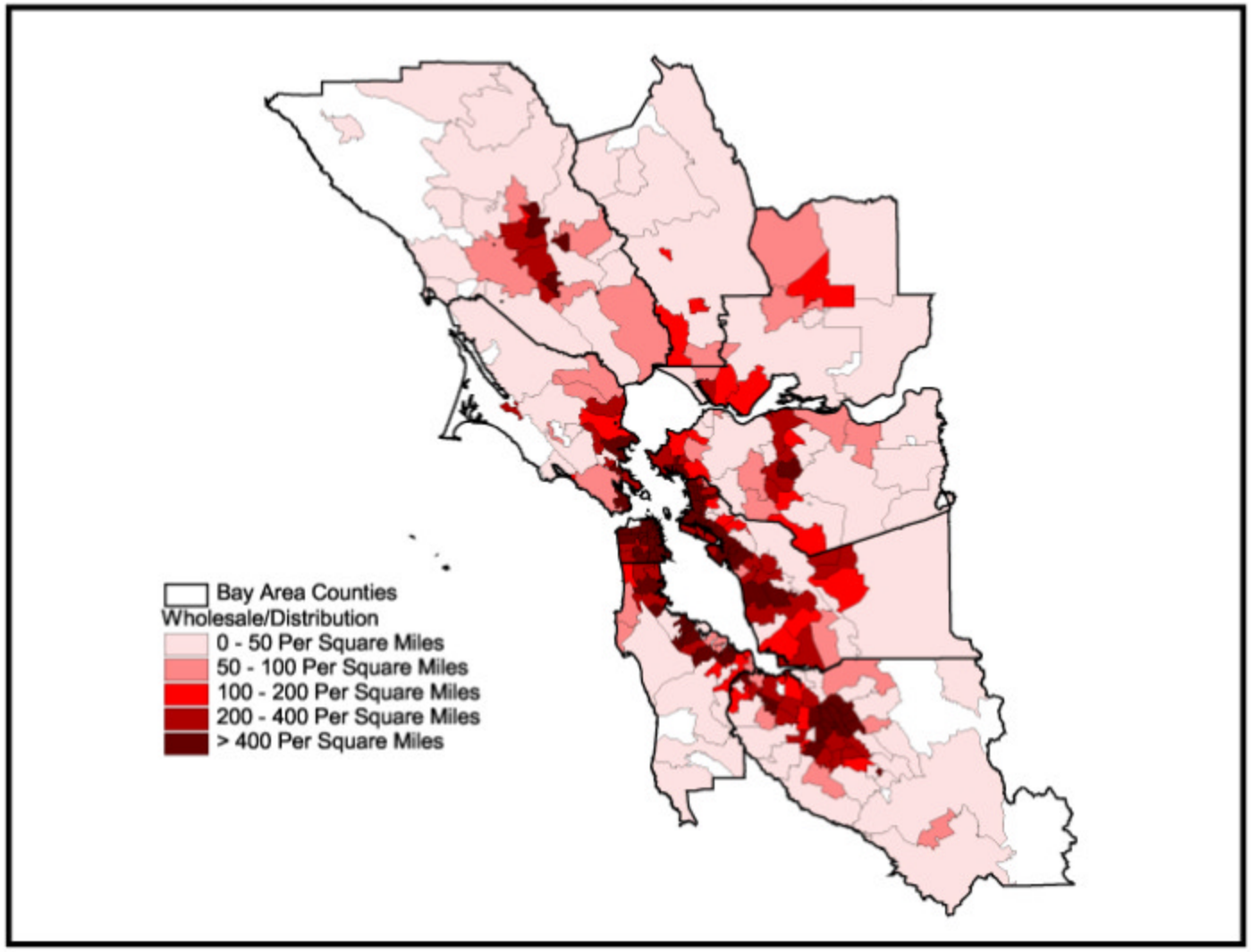
Distribution of Freight Facilities - Wholesale Trade Durable Goods (100 - 499 Employees)



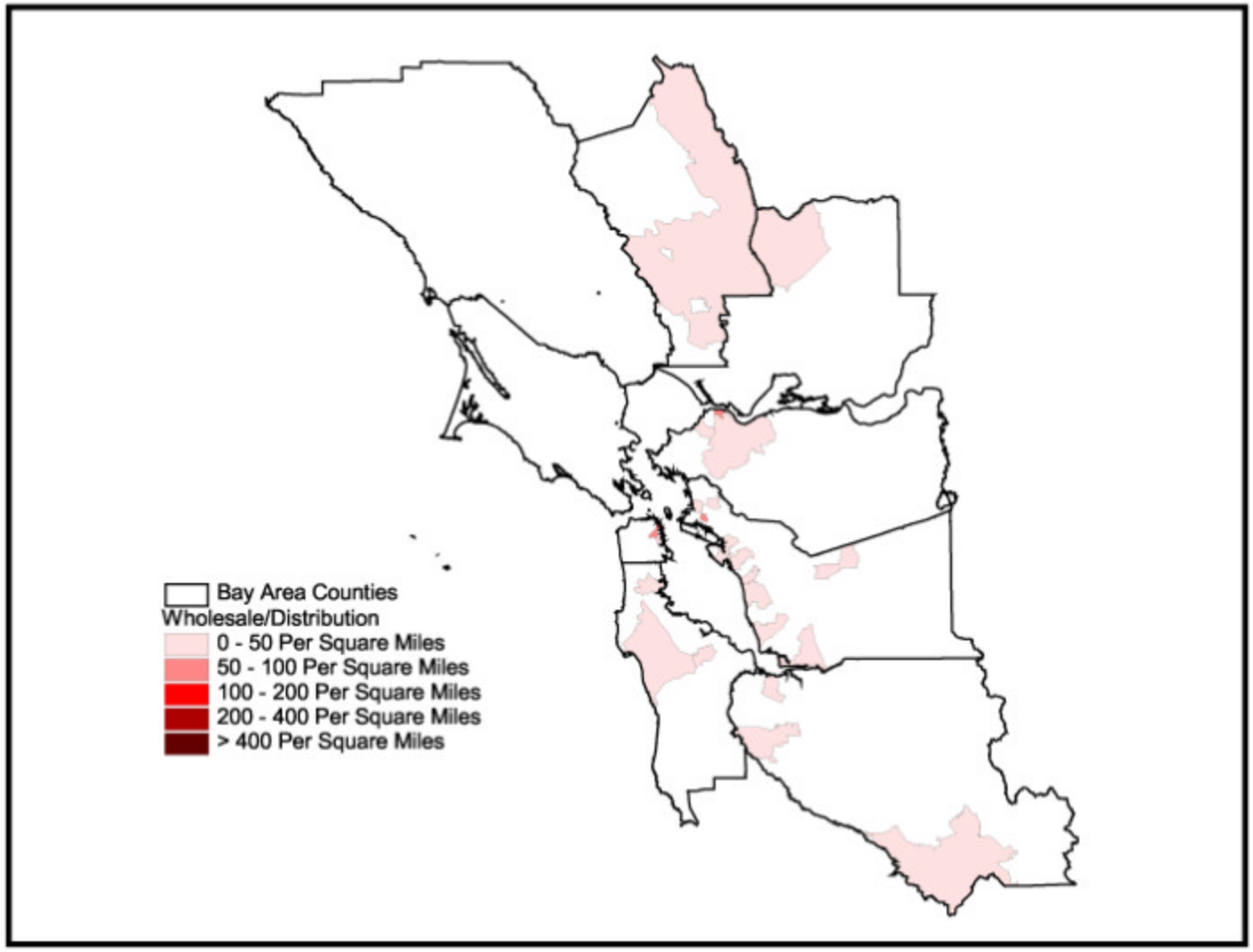
Distribution of Freight Facilities - Wholesale Trade Durable Goods (5,000 - 10,000 Employees)



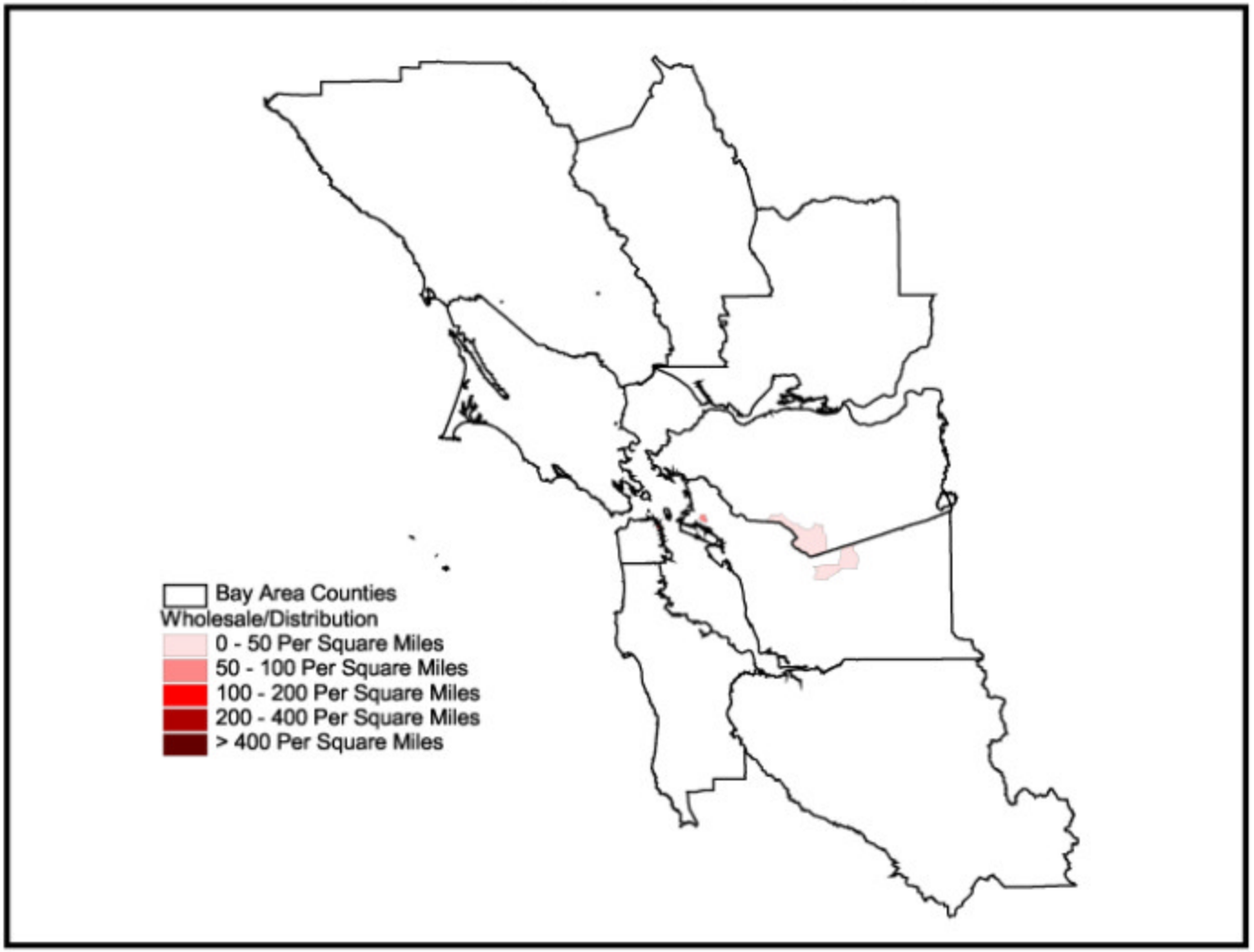
Distribution of Freight Facilities - Wholesale Trade
Non - Durable Goods (1 - 99 Employees)



Distribution of Freight Facilities - Wholesale Trade
Non - Durable Goods (500 - 4,999 Employees)



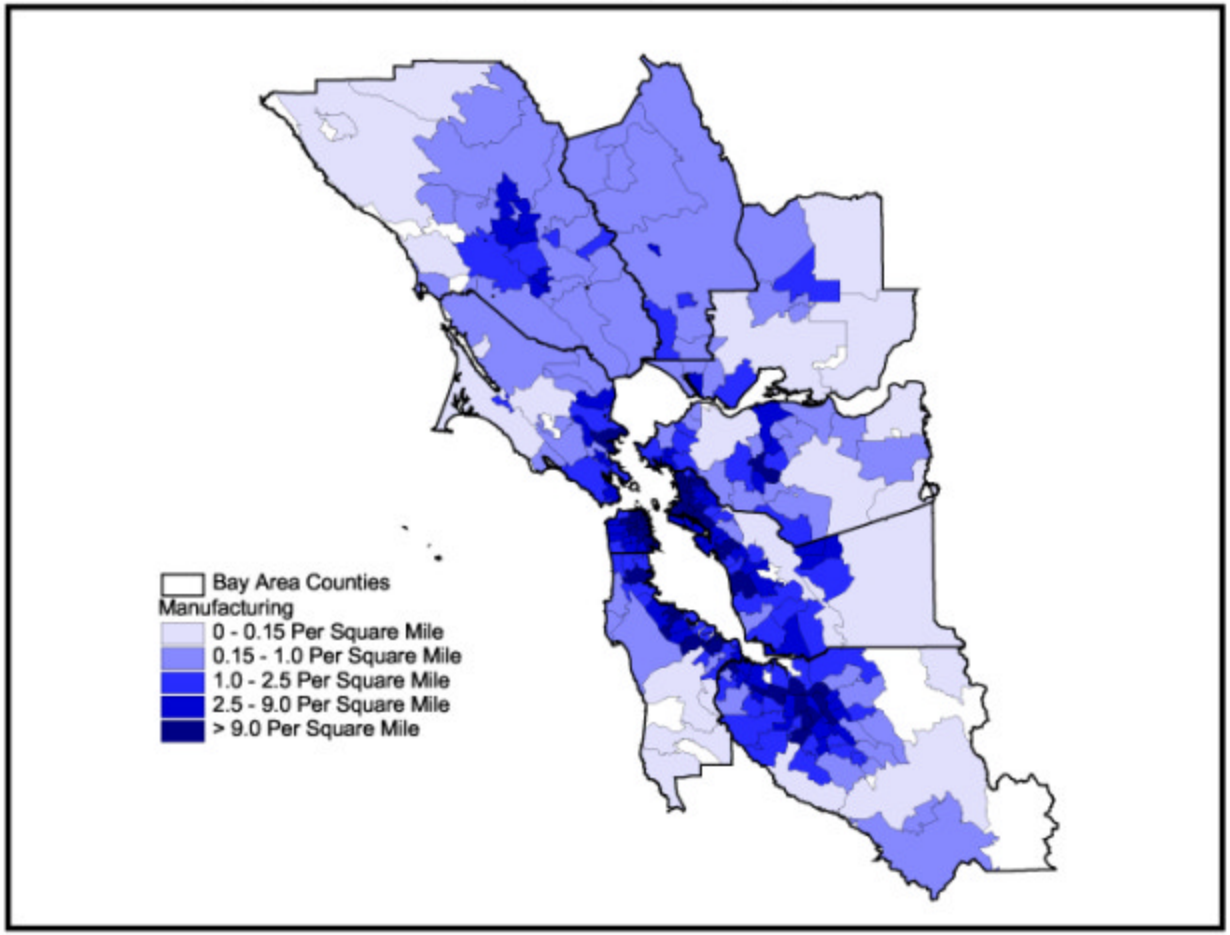
Distribution of Freight Facilities - Wholesale Trade Non - Durable Goods (5,000 - 10,000 Employees)



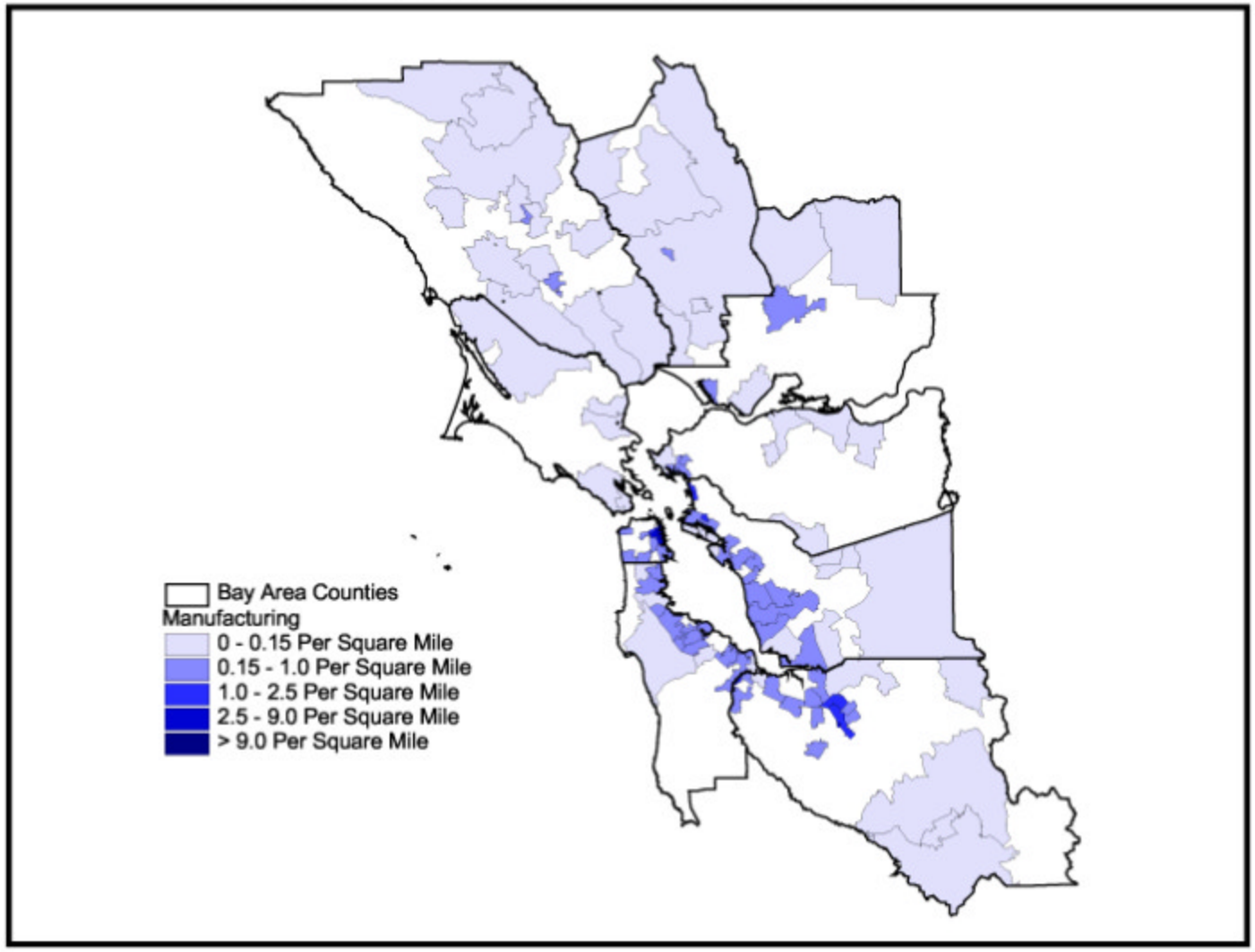
Manufacturing Facilities – Consumer Goods

- **Consist of:**
  - **Food & Kindered Products**
  - **Tobacco Products**
  - **Textile Mill Products**
  - **Apparel & Other Finished Products**
  - **Lumber & Wood Prods Except Furniture**
  - **Furniture & Fixture**
  - **Paper & Allied Products**
  - **Printing Publishing & Allied Industries**

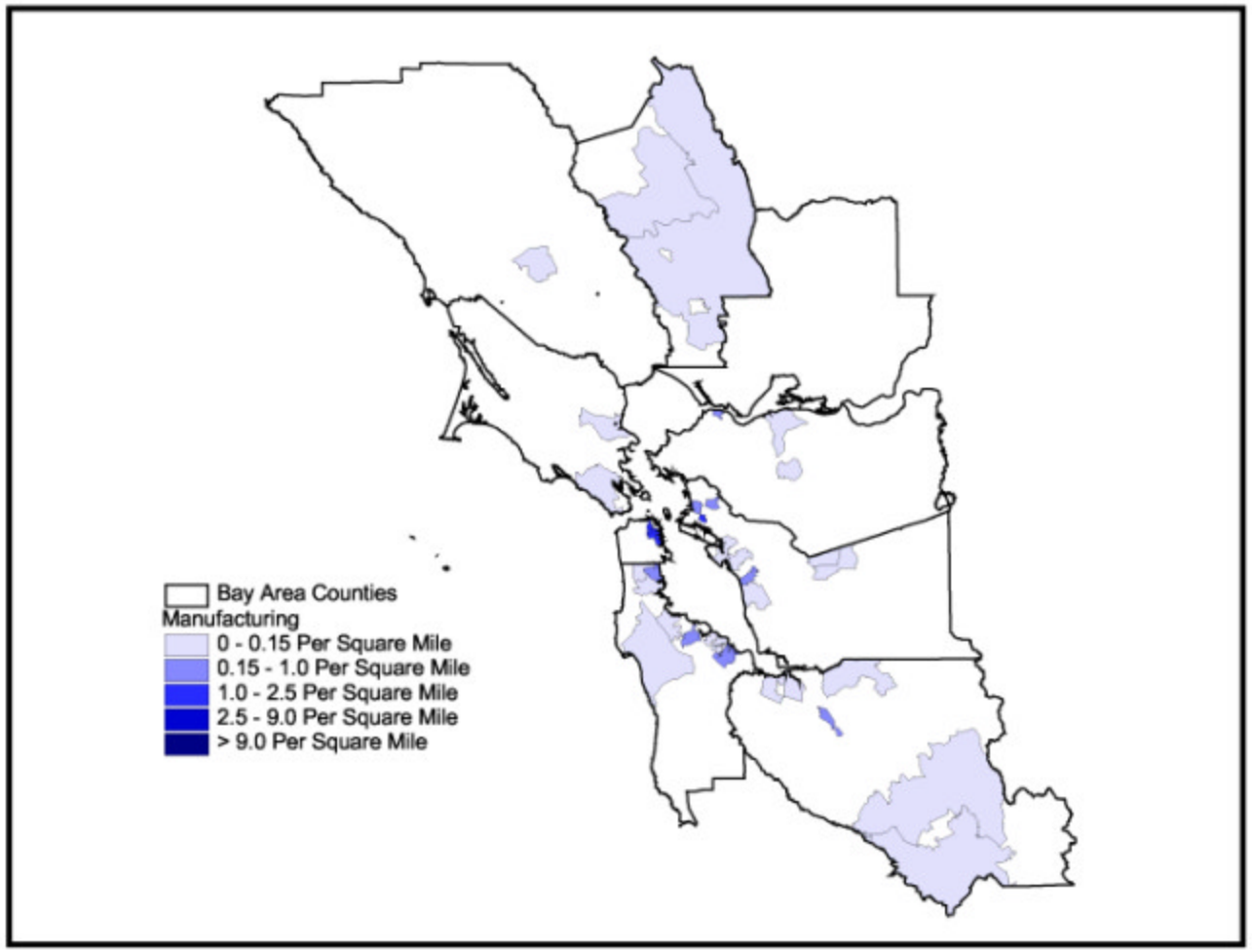
Distribution of Freight Facilities - Manufacturing Consumer Goods (1 - 99 Employees)



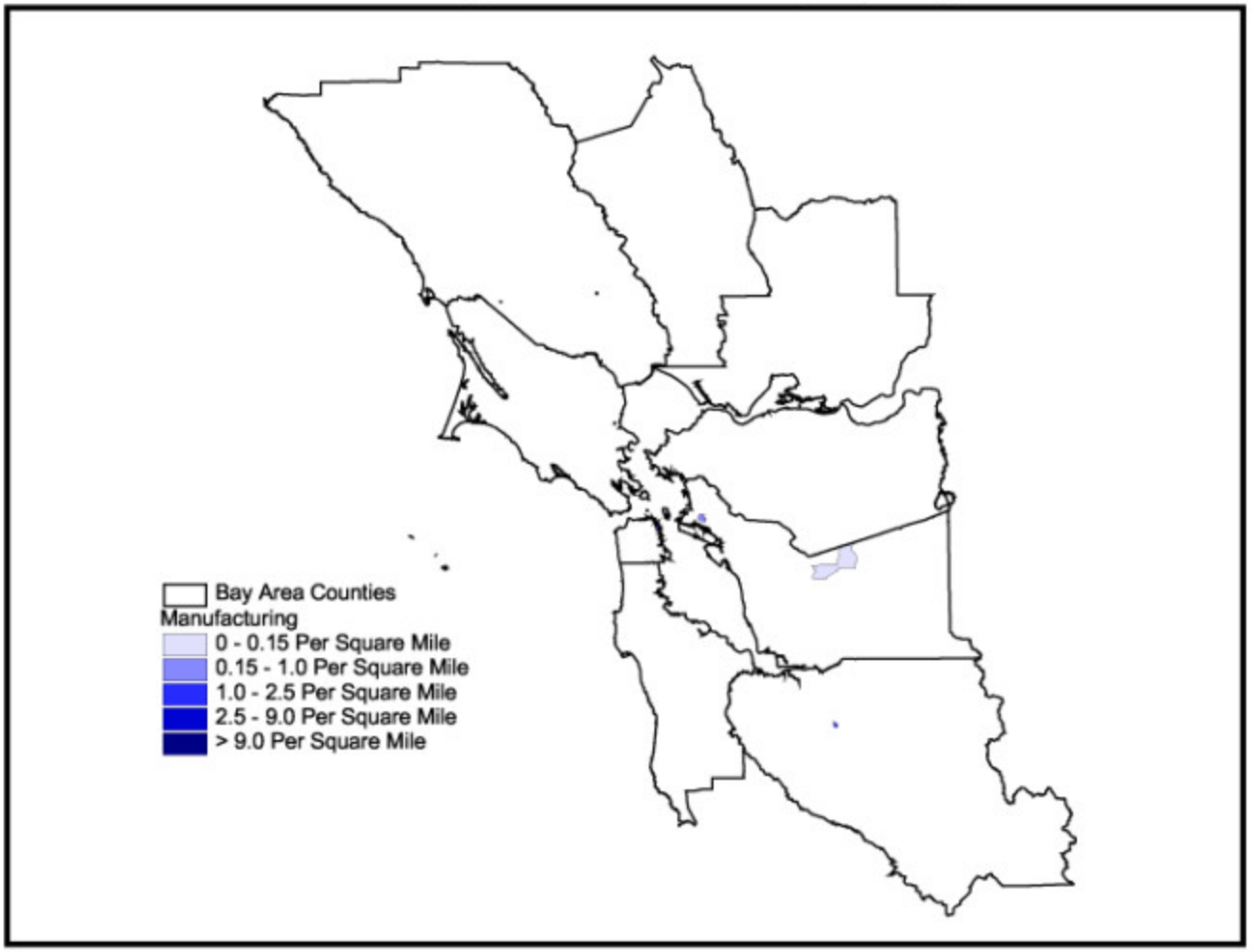
Distribution of Freight Facilities - Manufacturing Consumer Goods (100 - 499 Employees)



Distribution of Freight Facilities - Manufacturing Consumer Goods (500 - 4,999 Employees)



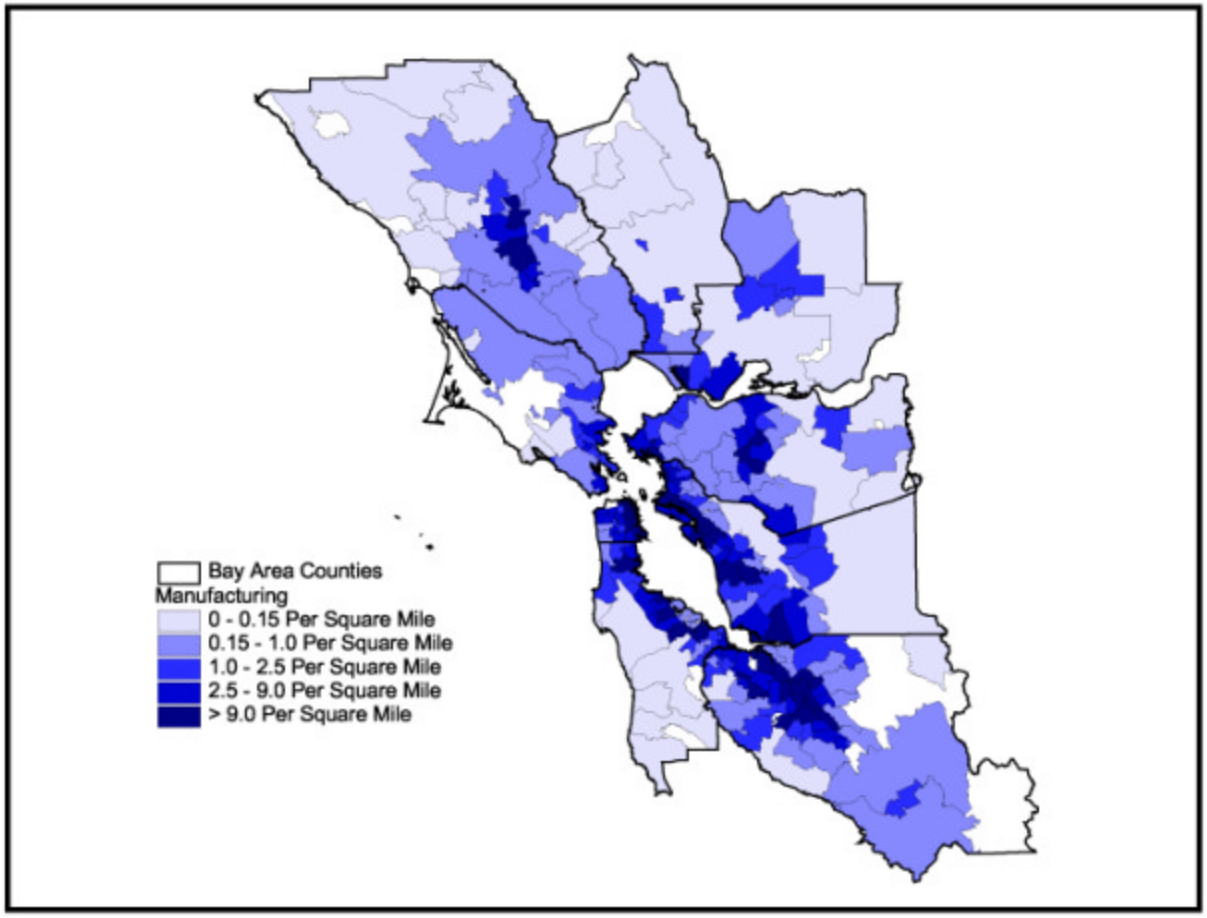
Distribution of Freight Facilities - Manufacturing Consumer Goods (5,000 - 10,000 Employees)



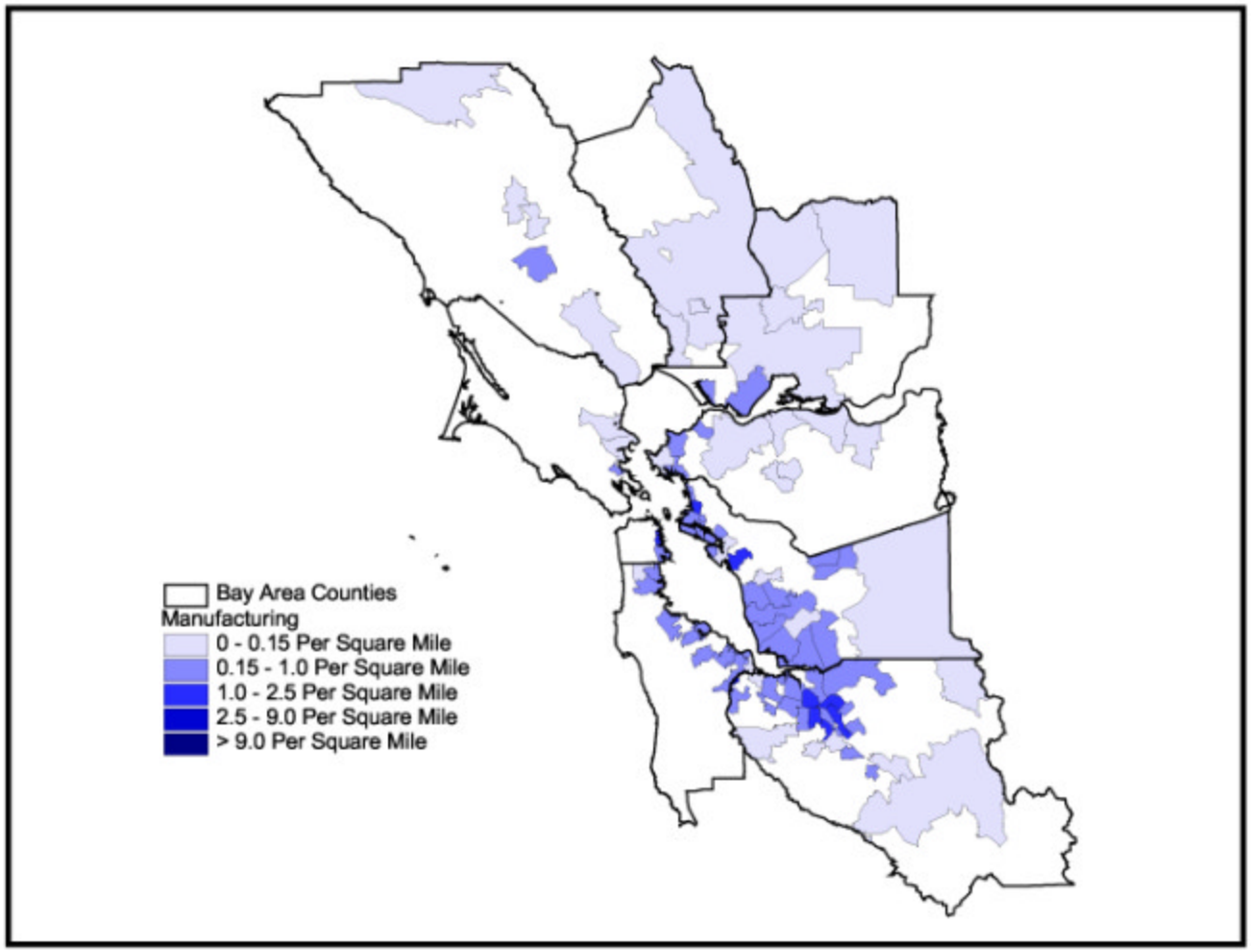
Manufacturing Facilities – Industrial Goods

- **Consist of:**
  - **Chemicals & Allied Products**
  - **Petroleum Refining & Related Inds**
  - **Rubber & Misc Plastics**
  - **Leather & Leather Products**
  - **Stone Clay Glass & Concrete Prods**
  - **Primary Metal Industries**
  - **Fabricated Metal Products**
  - **Industrial & Commercial Machinery**
  - **Transportation Equipments**
  - **Misc Manufacturing Inds**

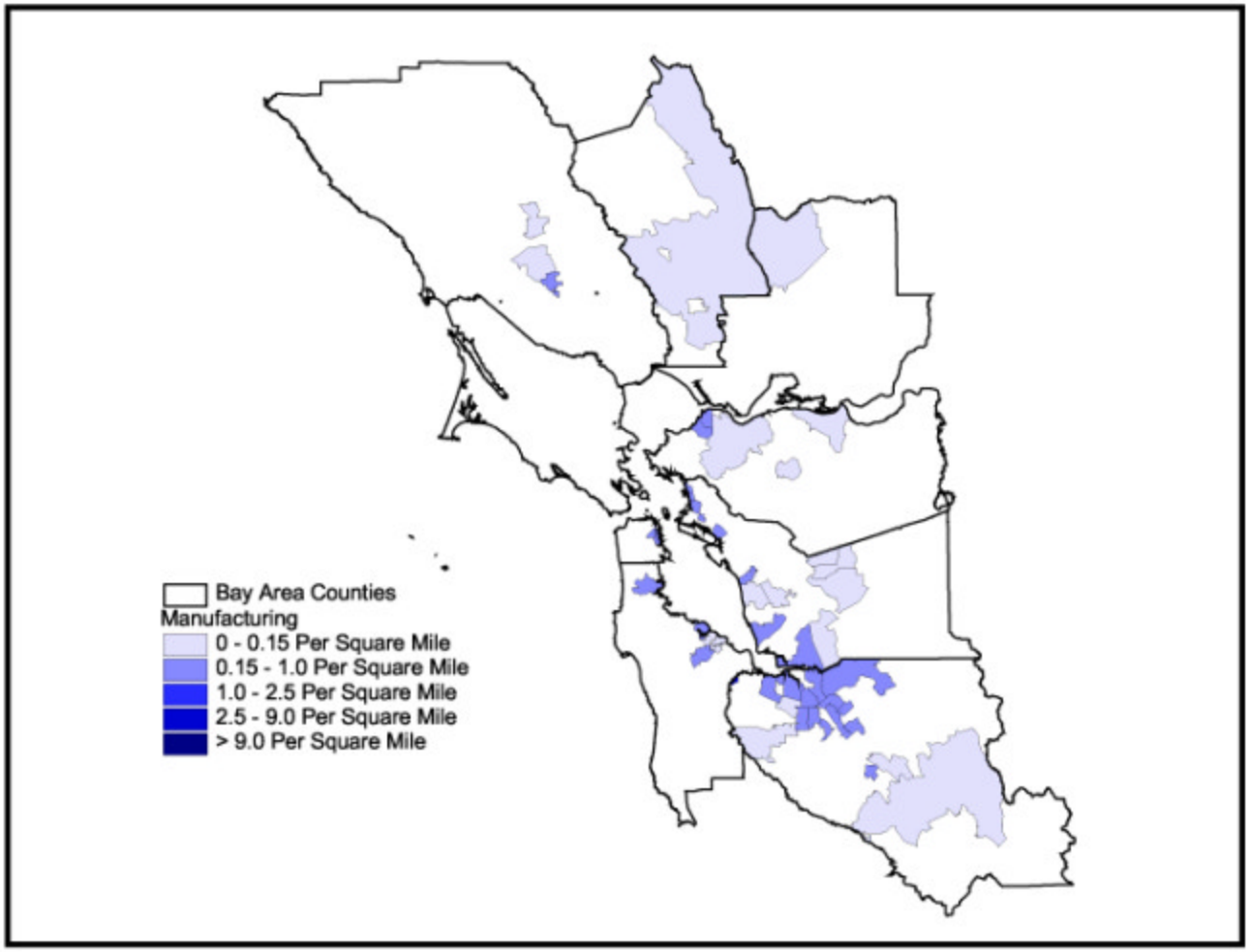
Distribution of Freight Facilities - Manufacturing Industrial Goods (1 - 99 Employees)



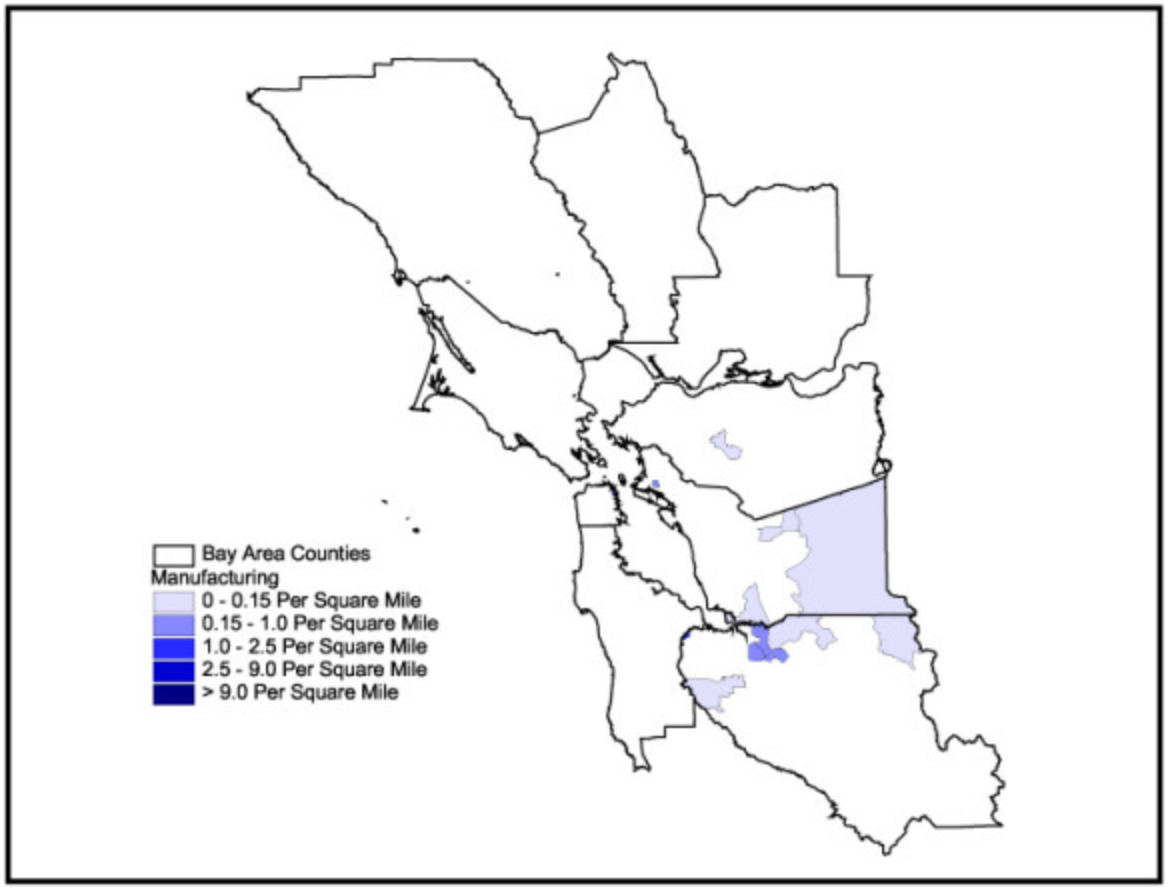
Distribution of Freight Facilities - Manufacturing Industrial Goods (100 - 499 Employees)



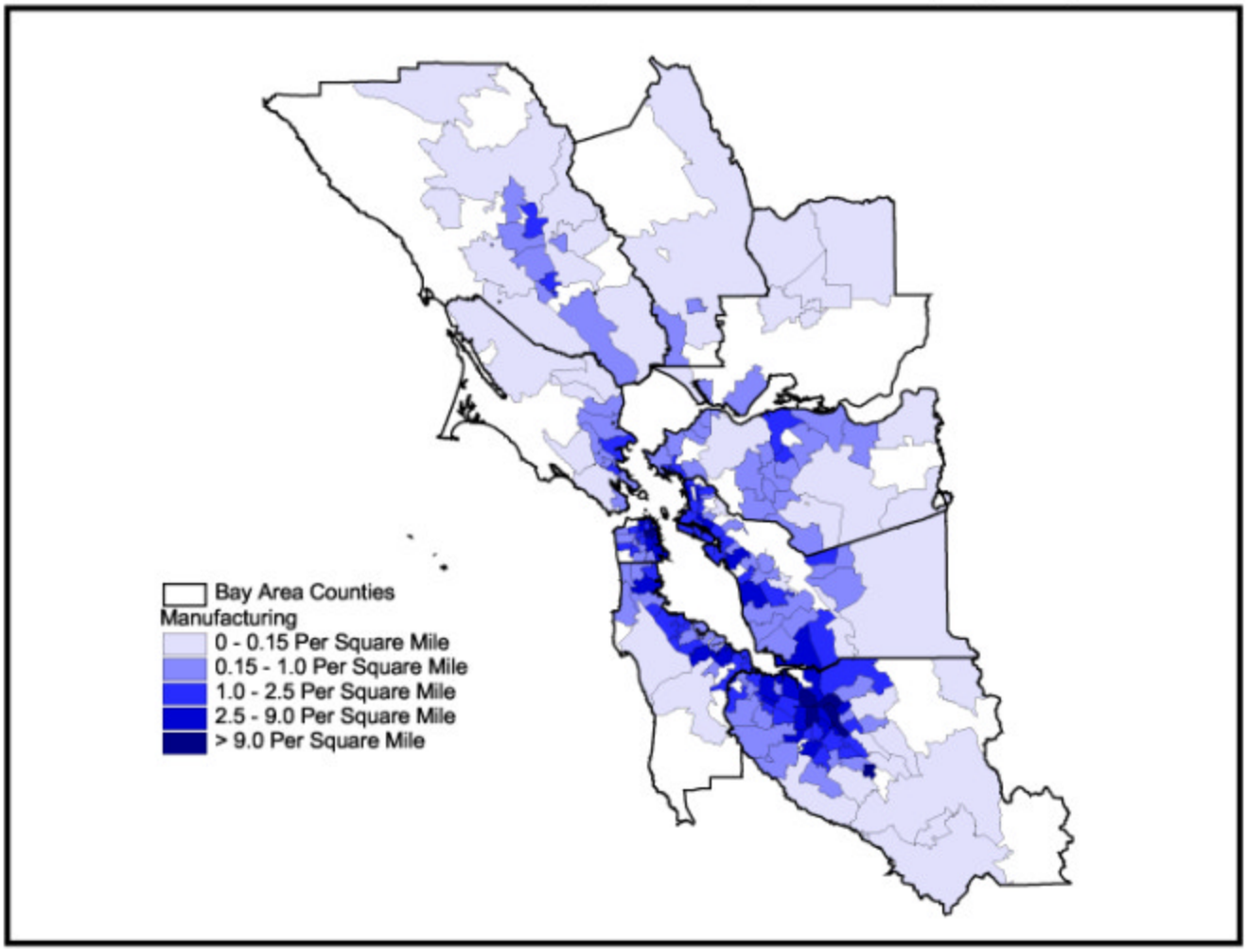
Distribution of Freight Facilities - Manufacturing Industrial Goods (500 - 4,999 Employees)



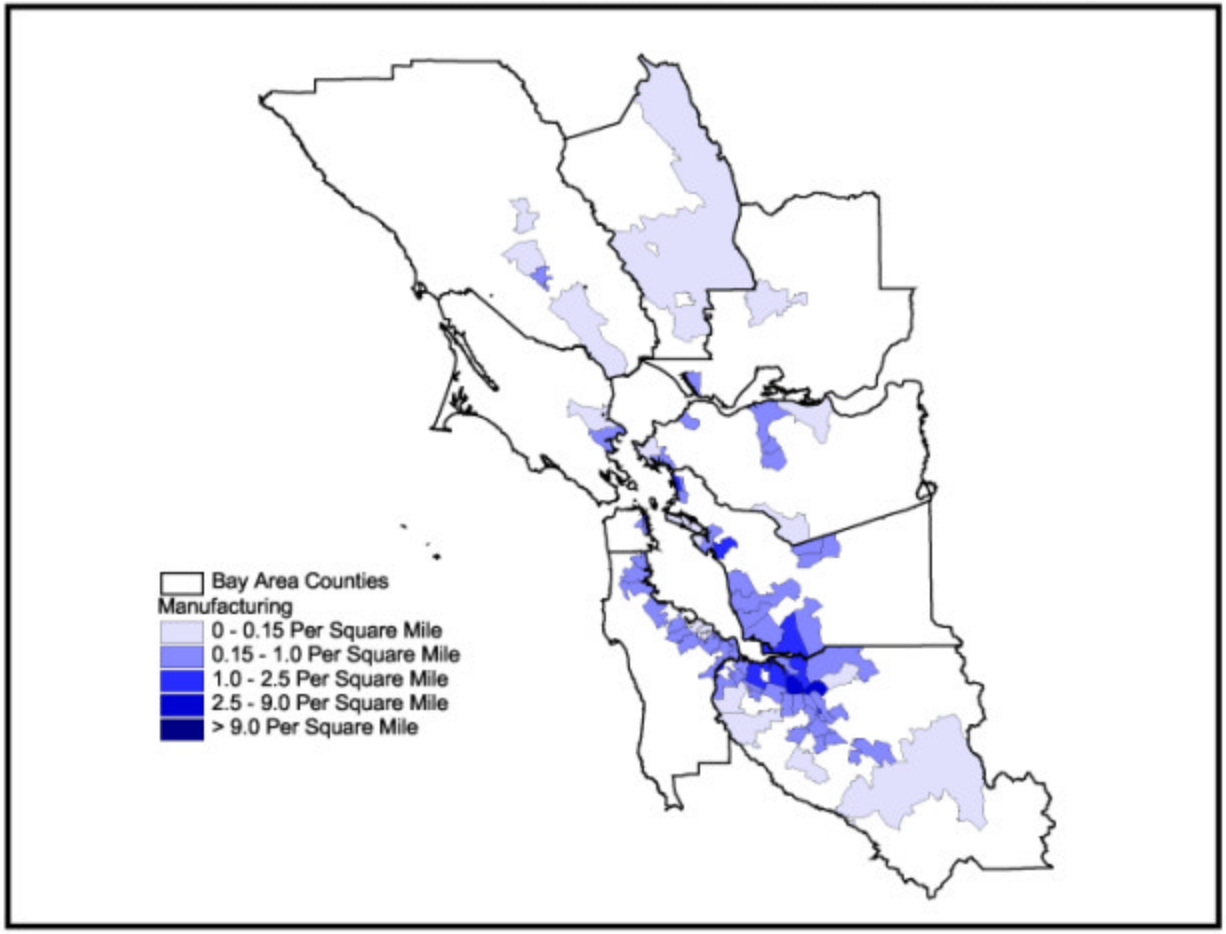
Distribution of Freight Facilities - Manufacturing Industrial Goods (5,000 - 10,000 Employees)



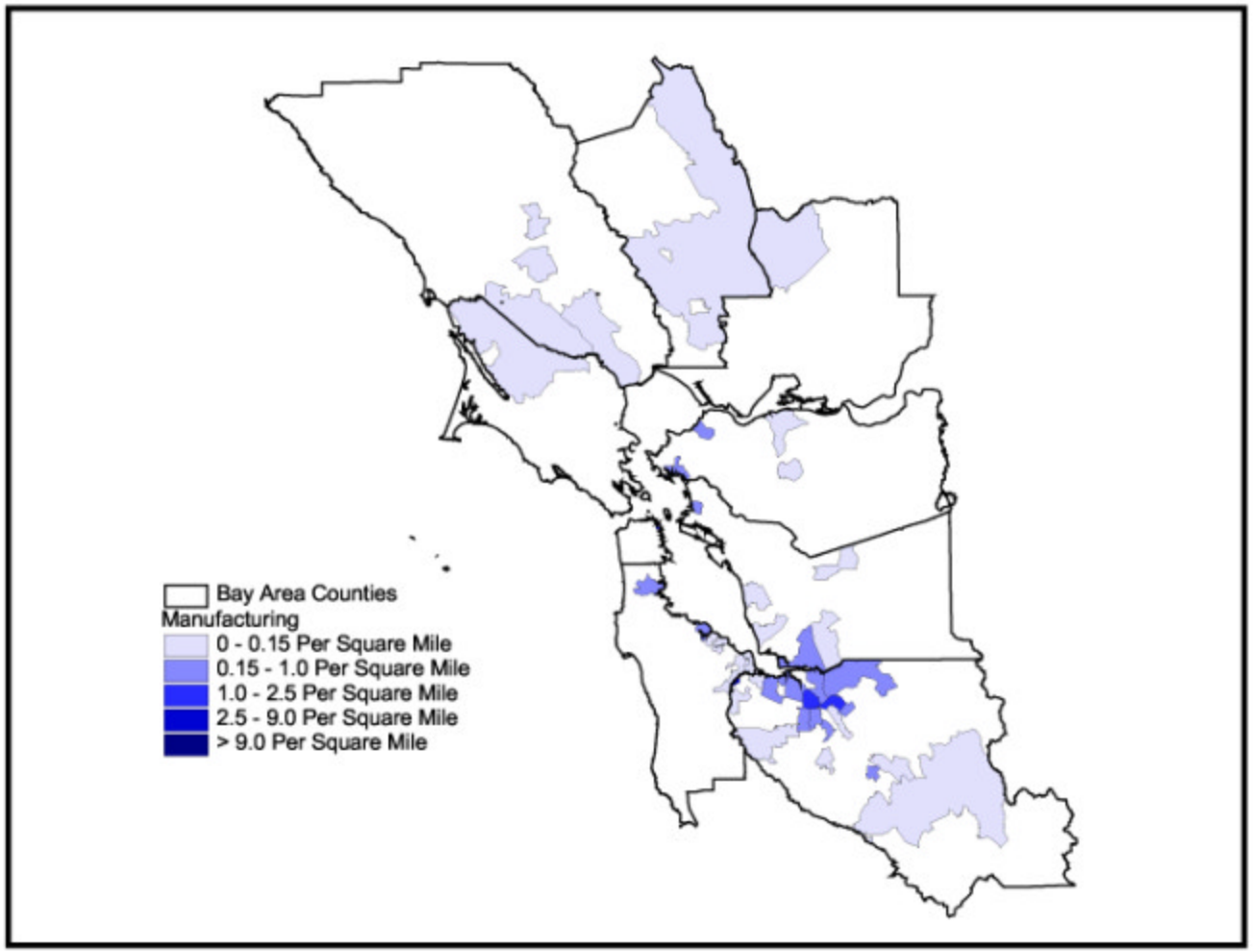
Distribution of Freight Facilities - Manufacturing Electronics, Electrical Measuring Goods (1 - 99 Employees)



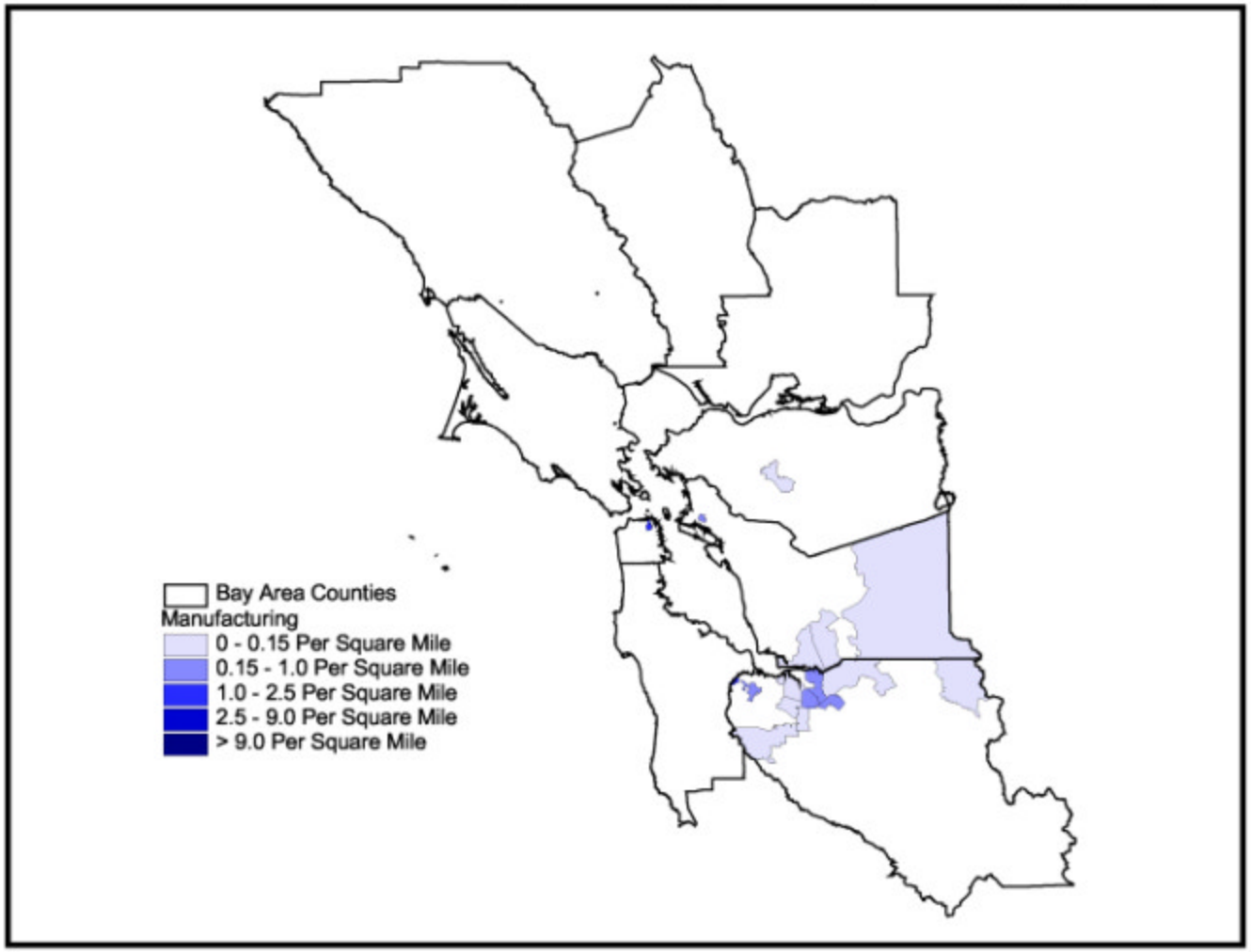
Distribution of Freight Facilities - Manufacturing Electronics, Electrical Measuring Goods (100 - 499 Employees)



Distribution of Freight Facilities - Manufacturing Electronics, Electrical Measuring Goods (500 - 4,999 Employees)



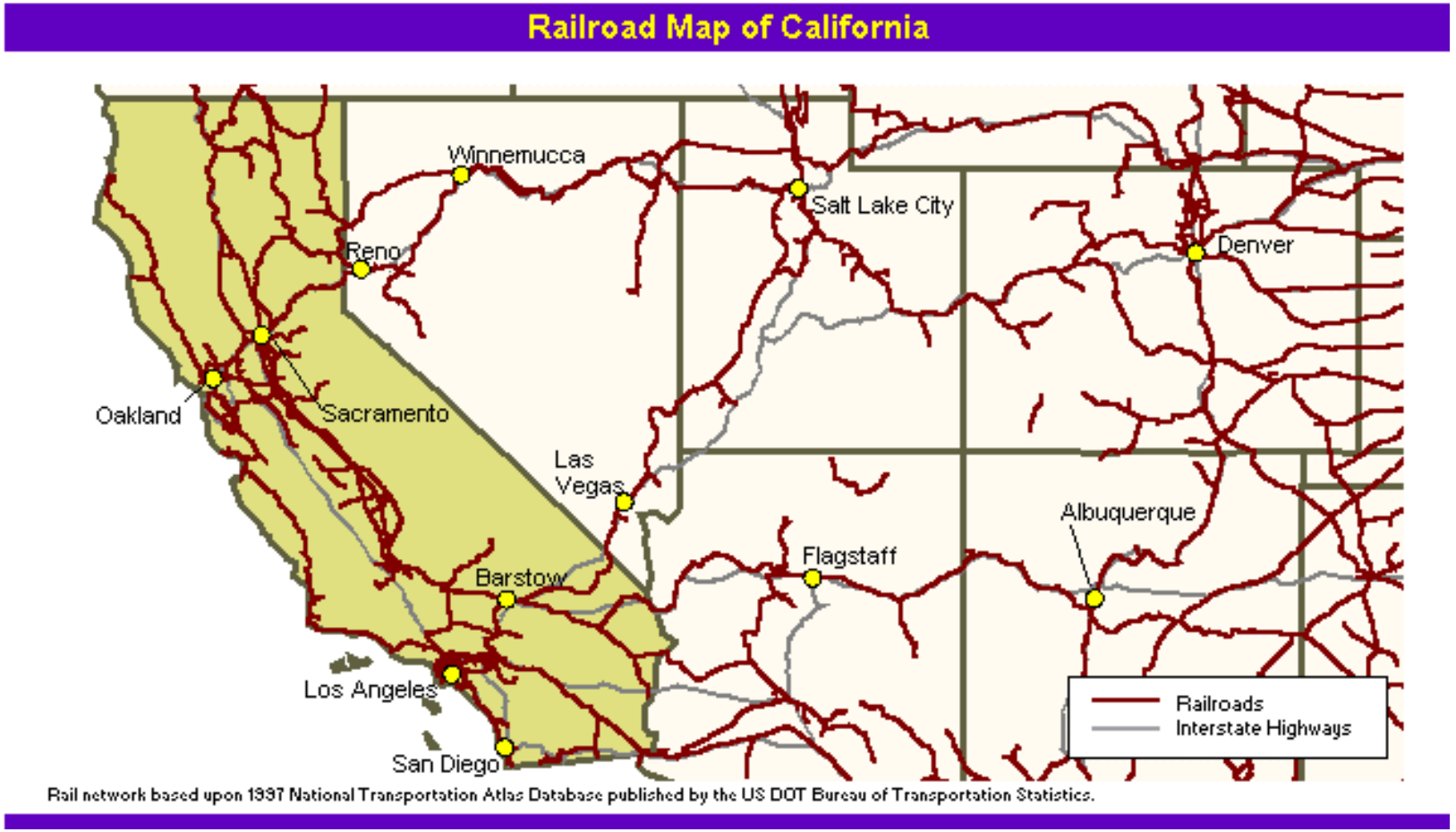
Distribution of Freight Facilities - Manufacturing Electronics, Electrical Measuring Goods (5,000 - 10,000 Employees)



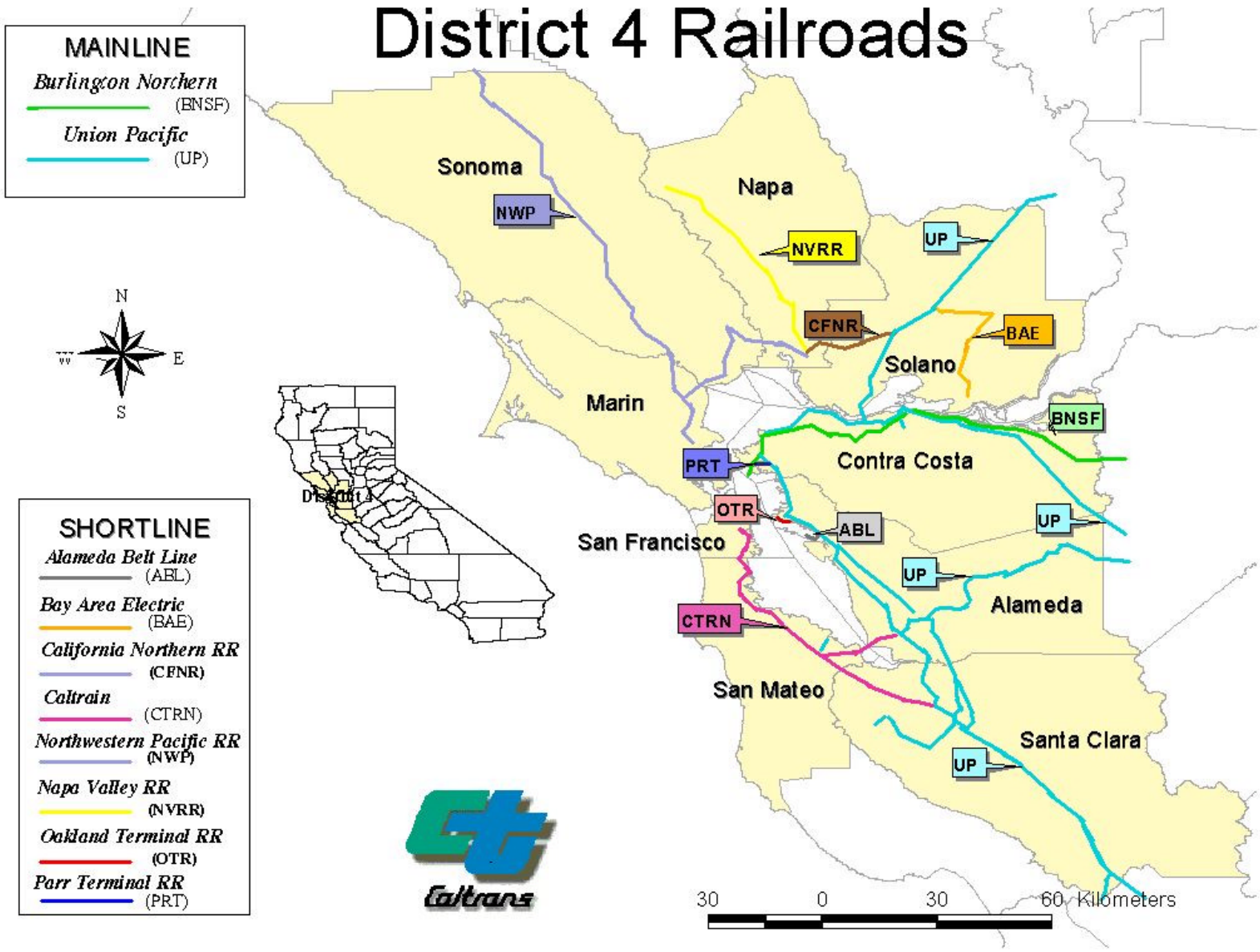
Rail Lines

- **Rail Network**
- **Rail Facilities**
- **Bay Area Rail Movements**

California Rail Network

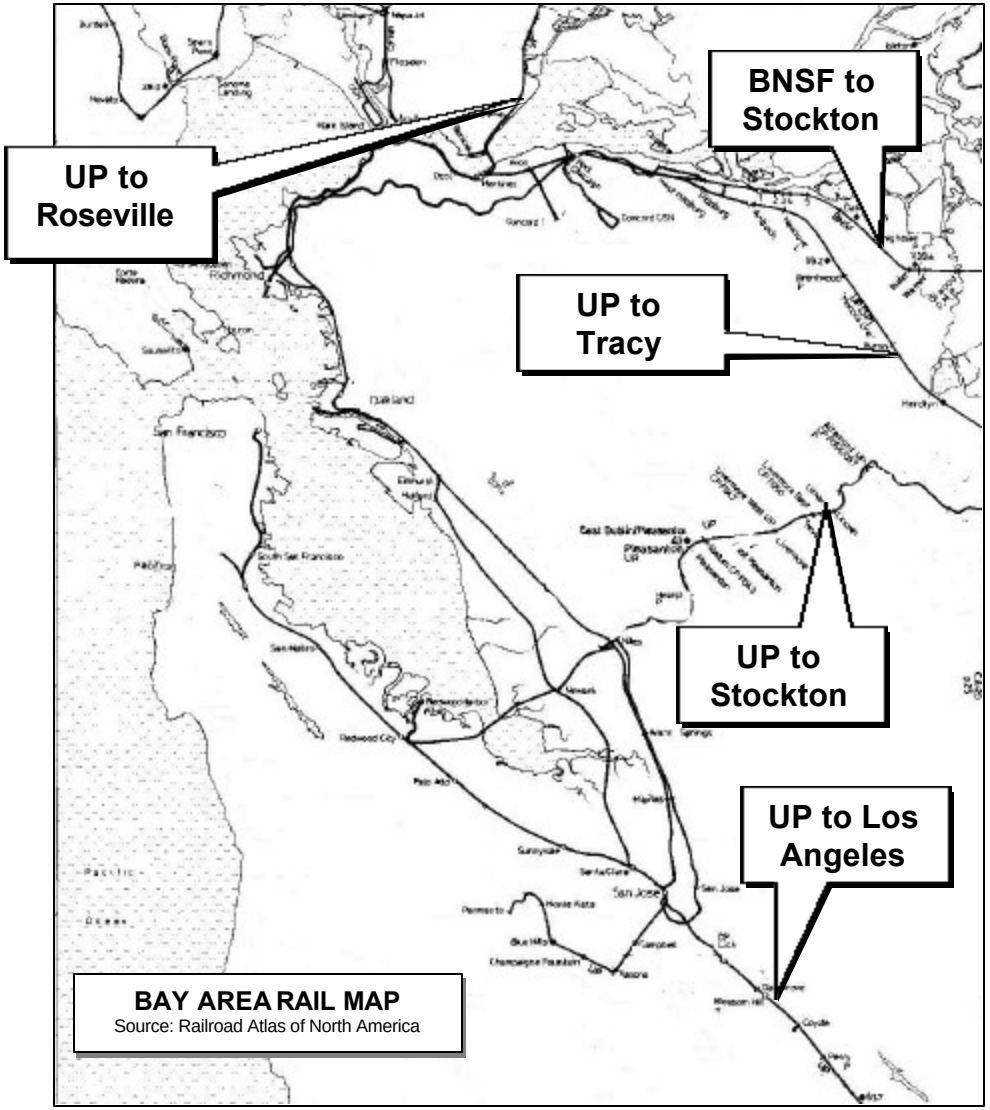


California Class 1 Rail Network


District 4 Railroads
MAINLINE
Burlington Northern (BNSF)
Union Pacific (UP)
SHORTLINE
Alameda Belt Line (ABL)
Bay Area Electric (BAE)
California Northern RR (CFNR)
Caltrain (CTRN)
Northwestern Pacific RR (NWP)
Napa Valley RR (NVRR)
Oakland Terminal RR (OTR)
Parr Terminal RR (PRT)
N
W
E
S
District 4
Sonoma
Napa
Solano
Marin
Contra Costa
San Francisco
Alameda
San Mateo
Santa Clara
NWP
NVRR
UP
CFNR
BAE
BNSF
PRT
OTR
ABL
CTRN
Caltrans
30 0 30 60 Kilometers

Bay Area Rail Map

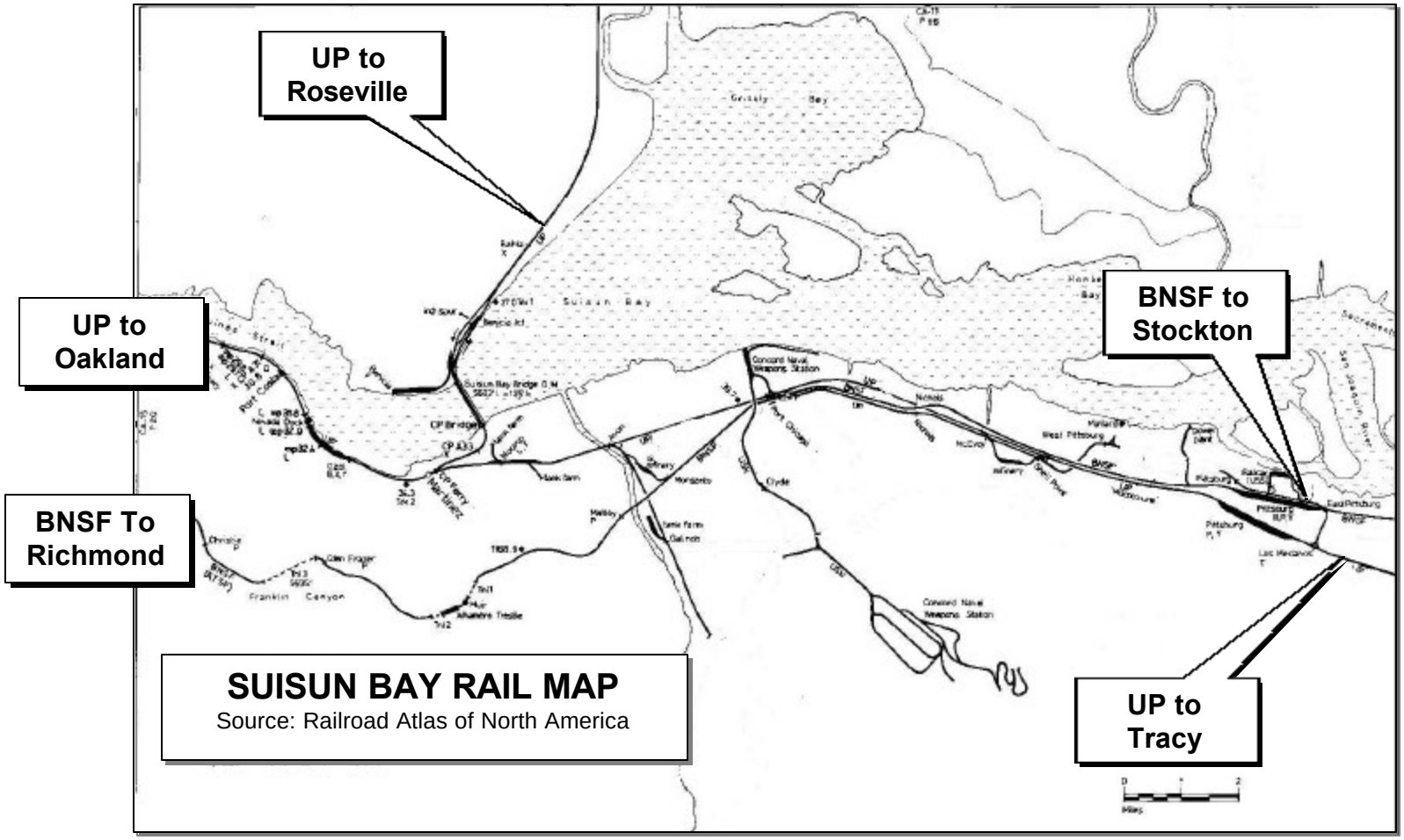
- The Bay Area is served by two major railroads and multiple main line connections.
- The Union Pacific (UP) system includes former Southern Pacific (SP) and Western Pacific (WP) lines and facilities.
- The Burlington Northern Santa Fe (BNSF) system includes form Santa Fe ATSF) lines and facilities.



Rail Facility Types

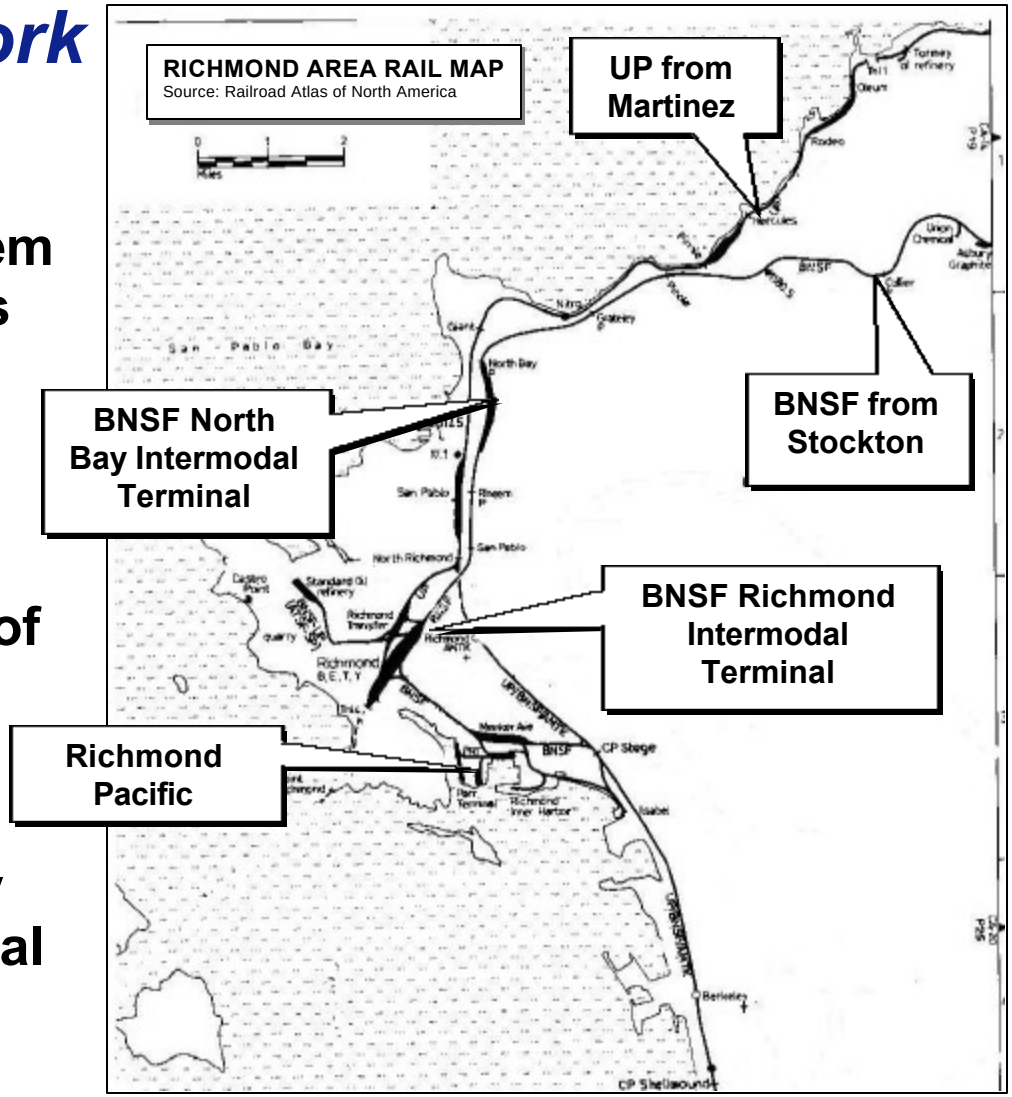
- Trackage and right-of-way
- Classification yards
- Local or industrial yards
- Intermodal terminals ("piggyback ramps")
- Auto-loading facilities ("auto ramps")
- Transload facilities
- Maintenance facilities

Suisun Bay Rail Network



Richmond Rail Network

- Richmond is the western terminus of the BNSF system and also includes refineries and other industrial customers.
- BNSF has two intermodal terminals in the area, both of which handle domestic traffic.
- Richmond Pacific (formerly Parr Terminal) provides local switching service.



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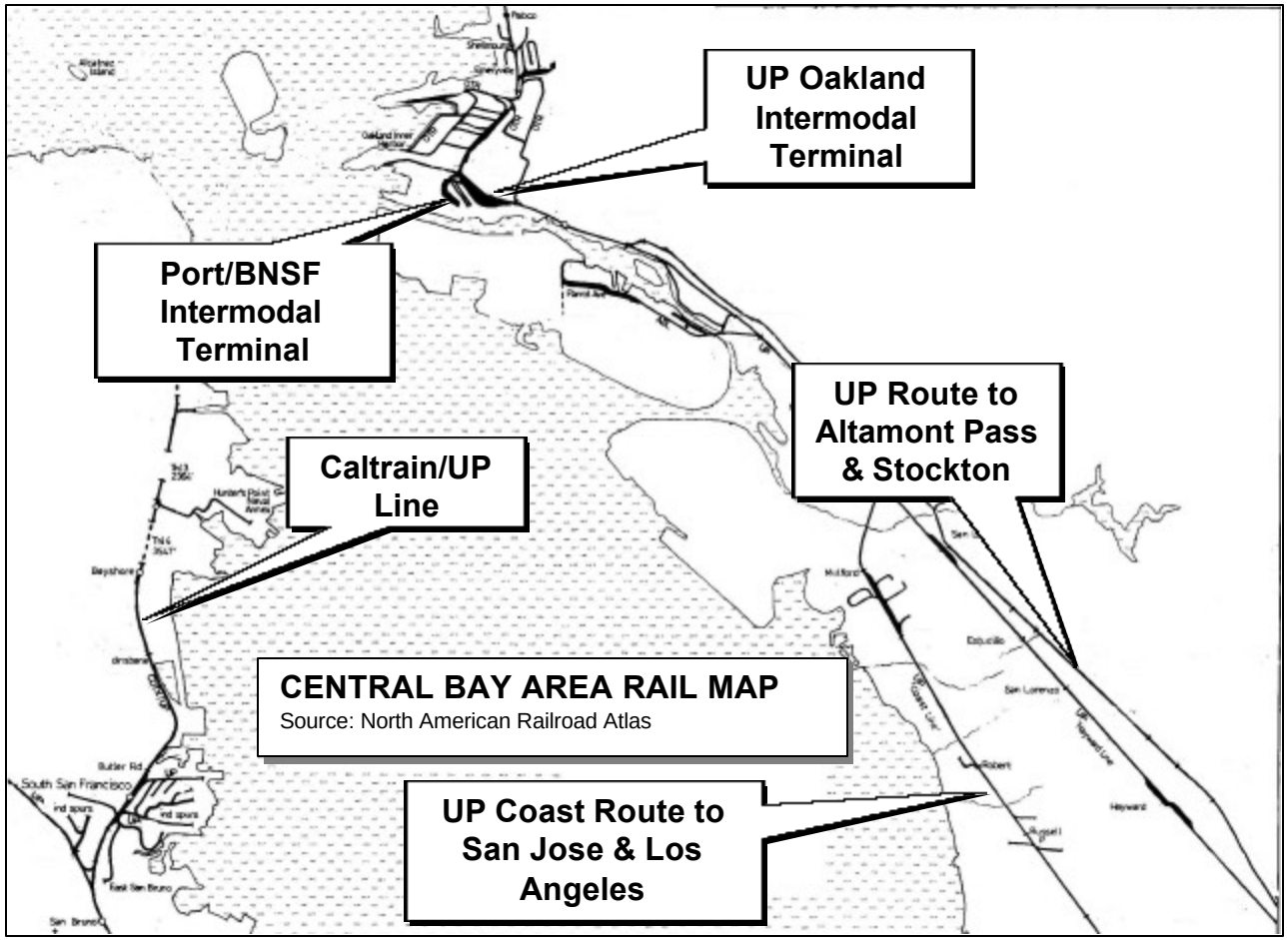
Oakland - SF Rail Network

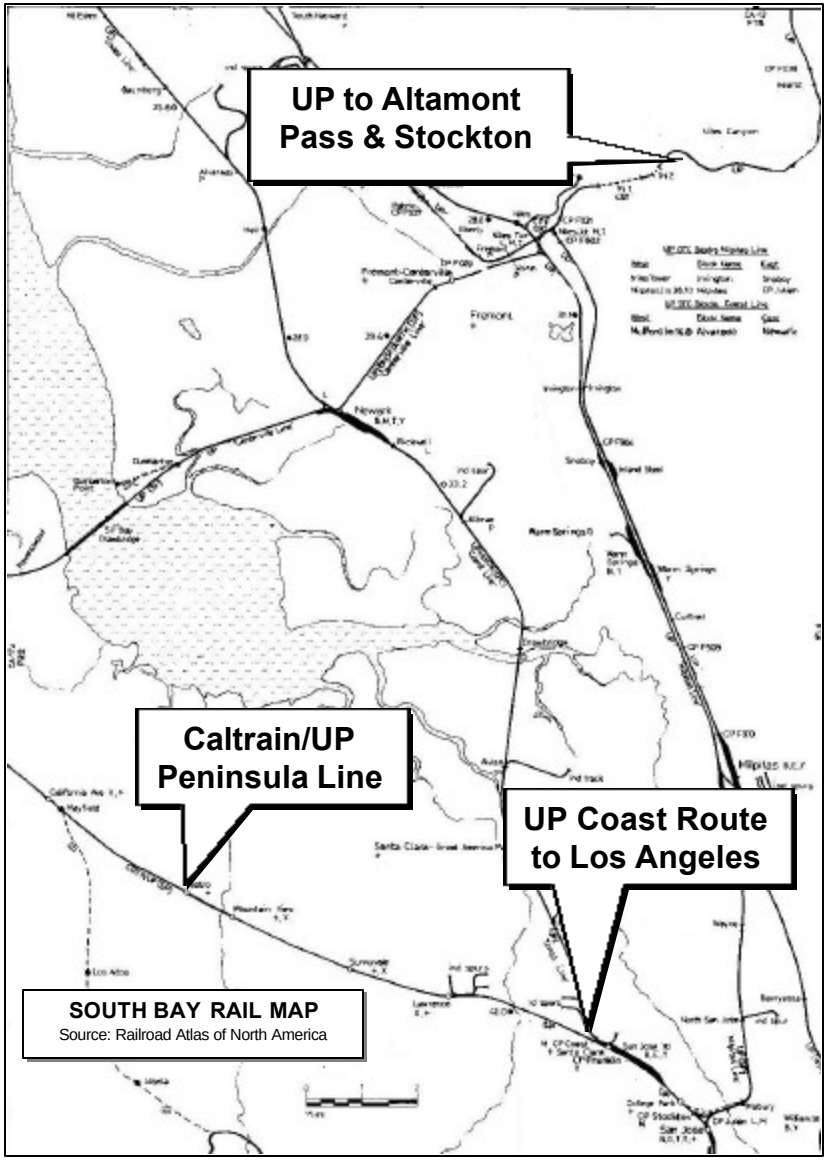
- Oakland is the center of Bay Area rail activity.
- UP & BNSF intermodal facilities generate most of the traffic.
- The Peninsula route has minimal freight business.



CAMBRIDGE SYSTEMATICS INC

South Bay Rail Network

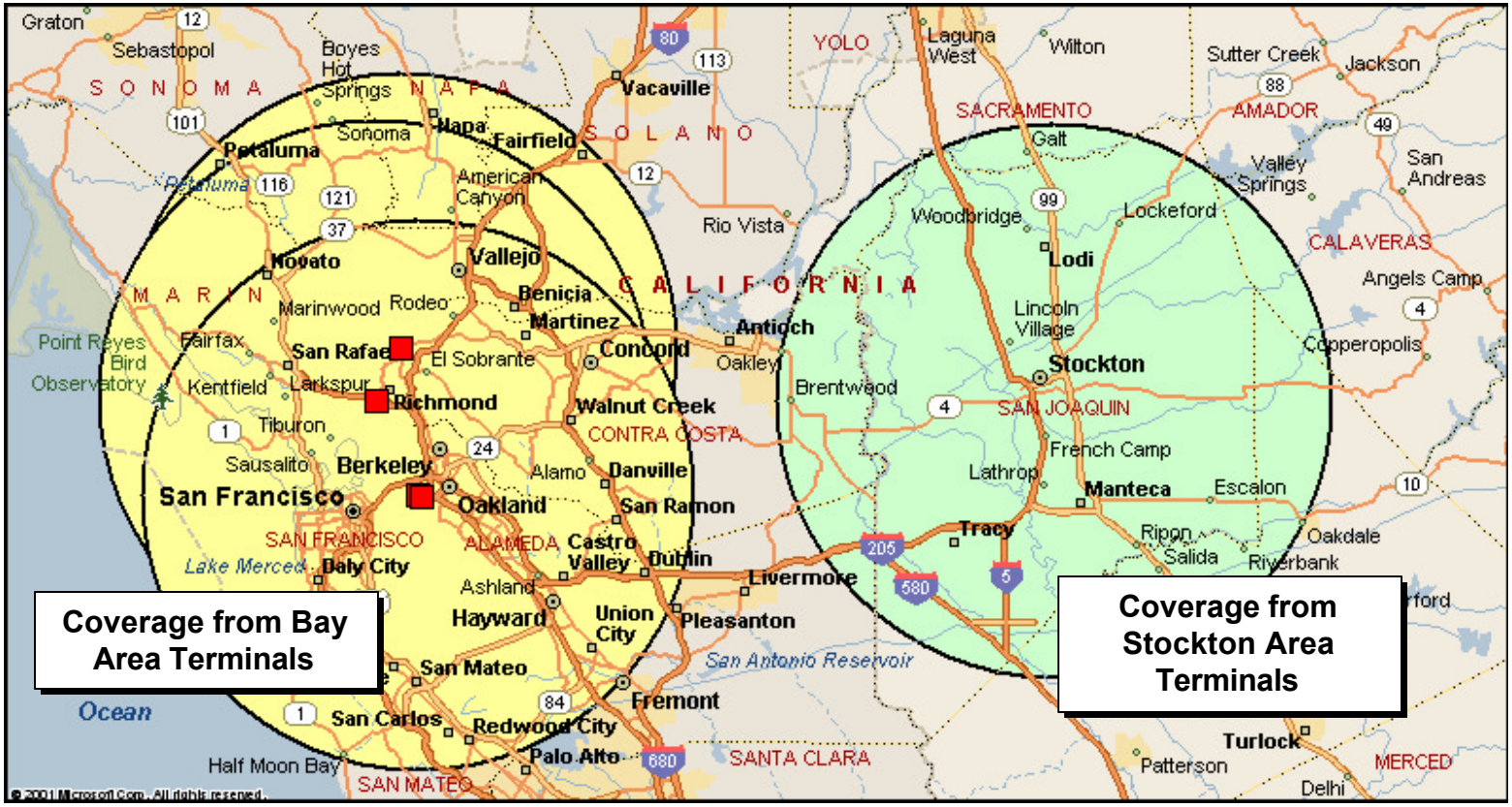
- The South Bay has multiple former SP and WP routes now operated by Union Pacific.
- A major customer is NUMMI at Warm Springs.



Rail Intermodal Terminals

* Oakland Intermodal Gateway

Intermodal Terminal Coverage



This figure 8 shows the coverage of existing intermodal facilities within a typical 25-mile trucking radius. As the figure shows, virtually all of the Bay Area is within 25 miles of an intermodal terminal, and there is relatively little market territory between the catchment areas for the Bay Area and Stockton intermodal terminals. This coverage area varies for any specific shipment.

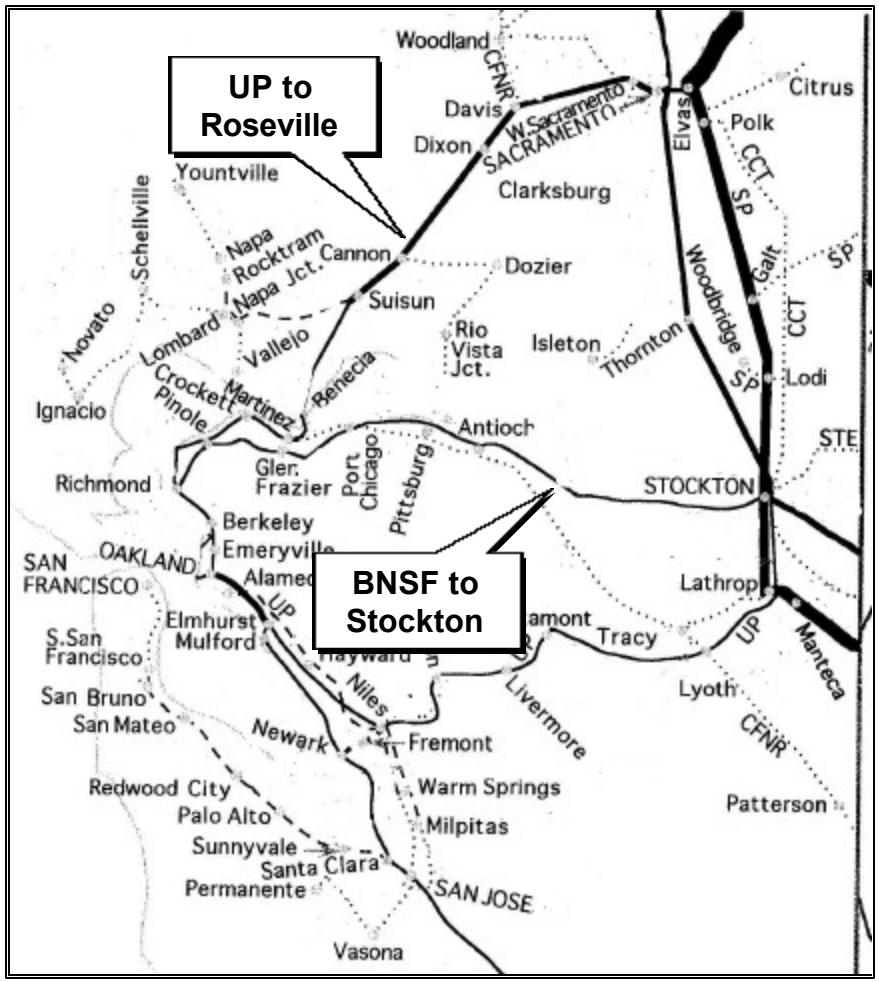
Rail Network Capacity

- **The regional rail network generally has reserve capacity, but there are a few serious limitations on the ability of the rail network to expand service.**

- **Geography: Rail lines require private right-of-way, and cannot efficiently negotiate the tighter curves or steeper grades common to freeways or highways. The possible routes for new or expanded rail lines are thus tightly constrained.**

- **Regional Network Age: The rail network pre-dates most of the present regional industrial configuration, and can be adapted or extended only with great difficulty.**

Rail Line Traffic Densities



- The major routes are:
  - UP to Roseville
  - BNSF to Stockton
- Other lines carry much smaller freight volumes

Railroad Freight Train and Movement Types

- **Unit trains of bulk commodities.** These consist of complete trains of a single commodity such as coal or grain in a regular movement between a fixed origin and a fixed destination. Technically, a unit train is a set of cars that remain together as a train for extended periods (a train of coal hoppers shuttling between a mine and a power plant, for example), but the term is also used to refer to regular movements of similar cars carrying the same commodity (a frequently operated train that carries only grain, for example).

- **Intermodal trains.** These consist of conventional, spine, or double-stack cars carrying intermodal trailers and/or containers between intermodal facilities or on-dock port facilities. Important examples are regularly scheduled double-stack container trains that connect with containership movements, and premium service trailer trains that carry parcel and motor carrier traffic.

- **Manifest trains.** These are the common freight trains whose consist of cars is mixed in both type and commodity and changes from day to day.

1999 Freight Train Counts

Union Pacific 1999 Freight Train Counts

Between Oakland and Stockton

	1999 Count
Intermodal	2,515
Manifest	1,008
Unit	579
All	4,102

Between Roseville and Oakland

	1999 Count
Intermodal	2,144
Manifest	3,247
Unit	51
All	5,442

Between San Luis Obispo and Oakland

	1999 Count
Intermodal	855
Manifest	1,872
Unit	221
All	2,948

BNSF 1999 Freight Train Counts

Between Stockton and Oakland

	1999 Count
Intermodal	4,959
Manifest	2,848
Unit	434
Local	3,196
All	11,439

Union Pacific Railroad Freight Handled

Source: California State Rail Plan 2001-02 through 2010-11

BNSF Railroad Freight Handled

Source: California State Rail Plan 2001-02 through 2010-11

Bay Area Rail Movements – Overview

- **Bay Area rail movement estimates were derived from the 1999 Carload Waybill Sample. The data show about 21 million tons of rail freight in 1999.**
  - **The Bay Area is a consuming region: inbound tonnage (including westbound exports) was roughly double the outbound tonnage (including eastbound imports).**
  - **The tonnage was about two-thirds carload and about one-third intermodal.**

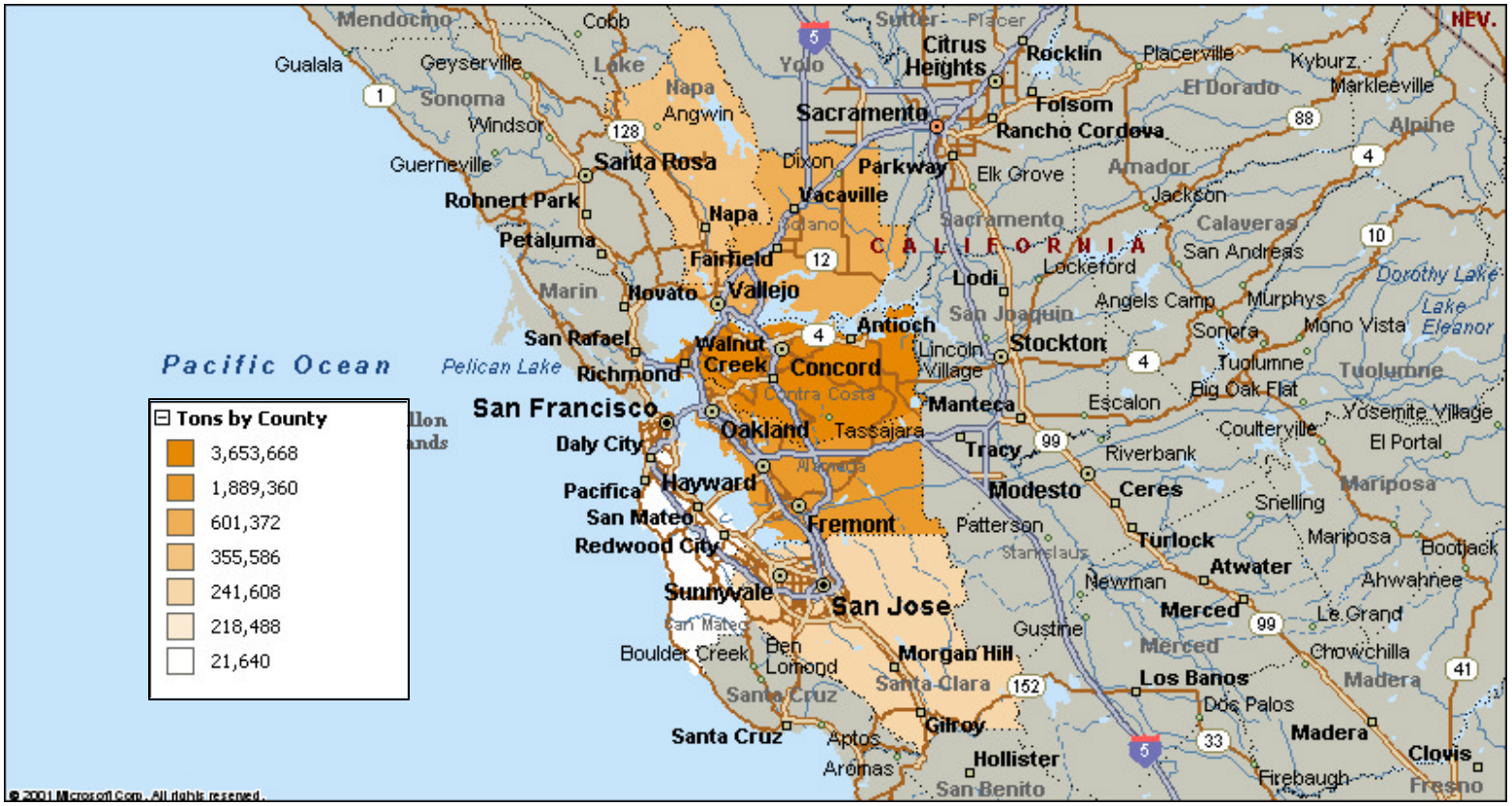
1999 Bay Area Rail Tonnage					
	Carload Tons	Carload Share	Intermodal Tons	Intermodal Share	Total
Inbound	9,472,020	66%	4,789,024	34%	14,261,044
Outbound	4,035,598	58%	2,946,124	42%	6,981,722
Total	13,507,618	64%	7,735,148	36%	21,242,766

Destinations of Outbound Rail Shipments

- **Outbound rail shipments are mostly carload moves to other points in California or intermodal moves via the Chicago gateway.**

Origin Counties of Outbound Rail Shipments

- **The major origins are intermodal and carload sources in Alameda and Contra Costa Counties.**



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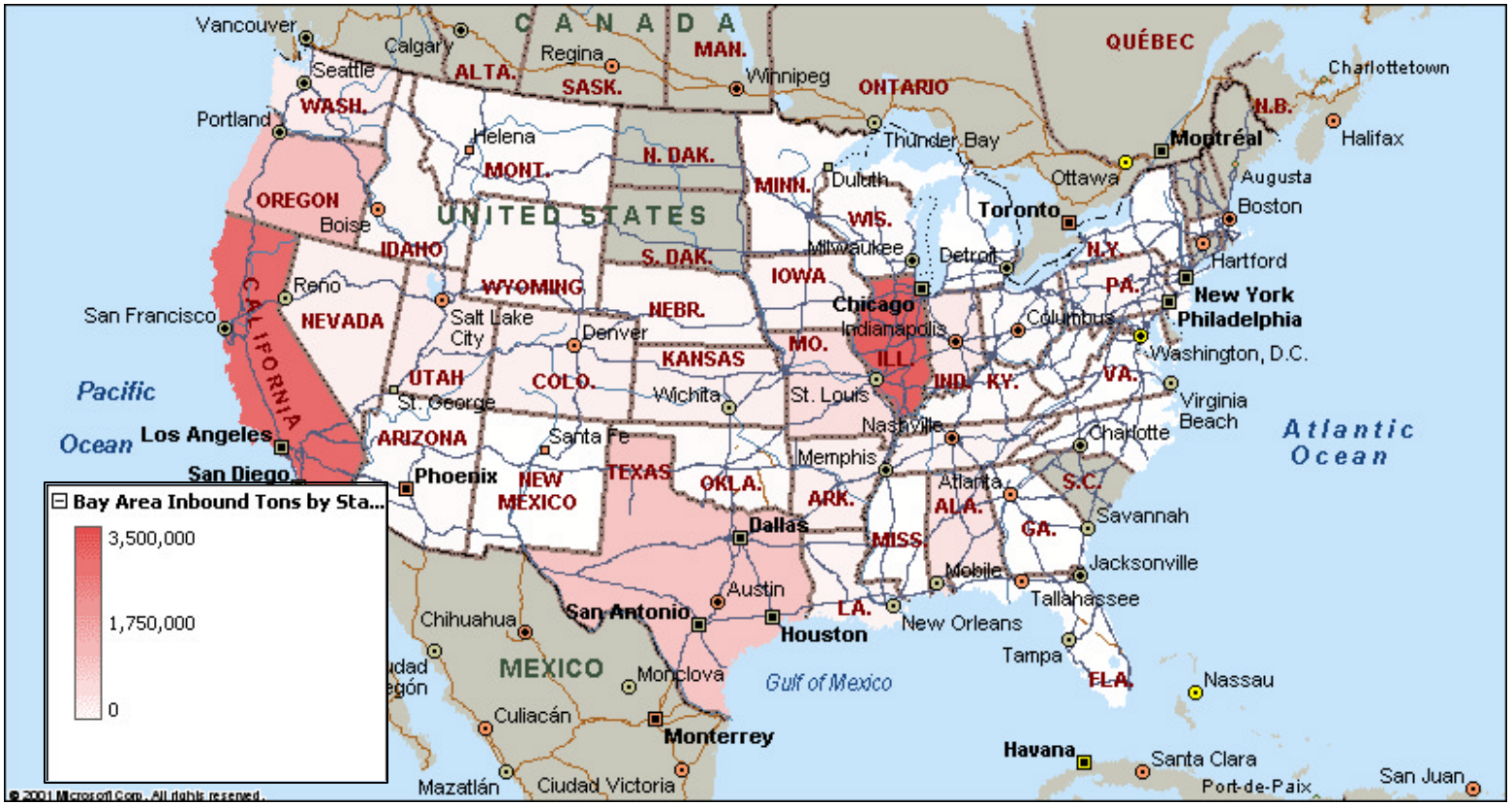
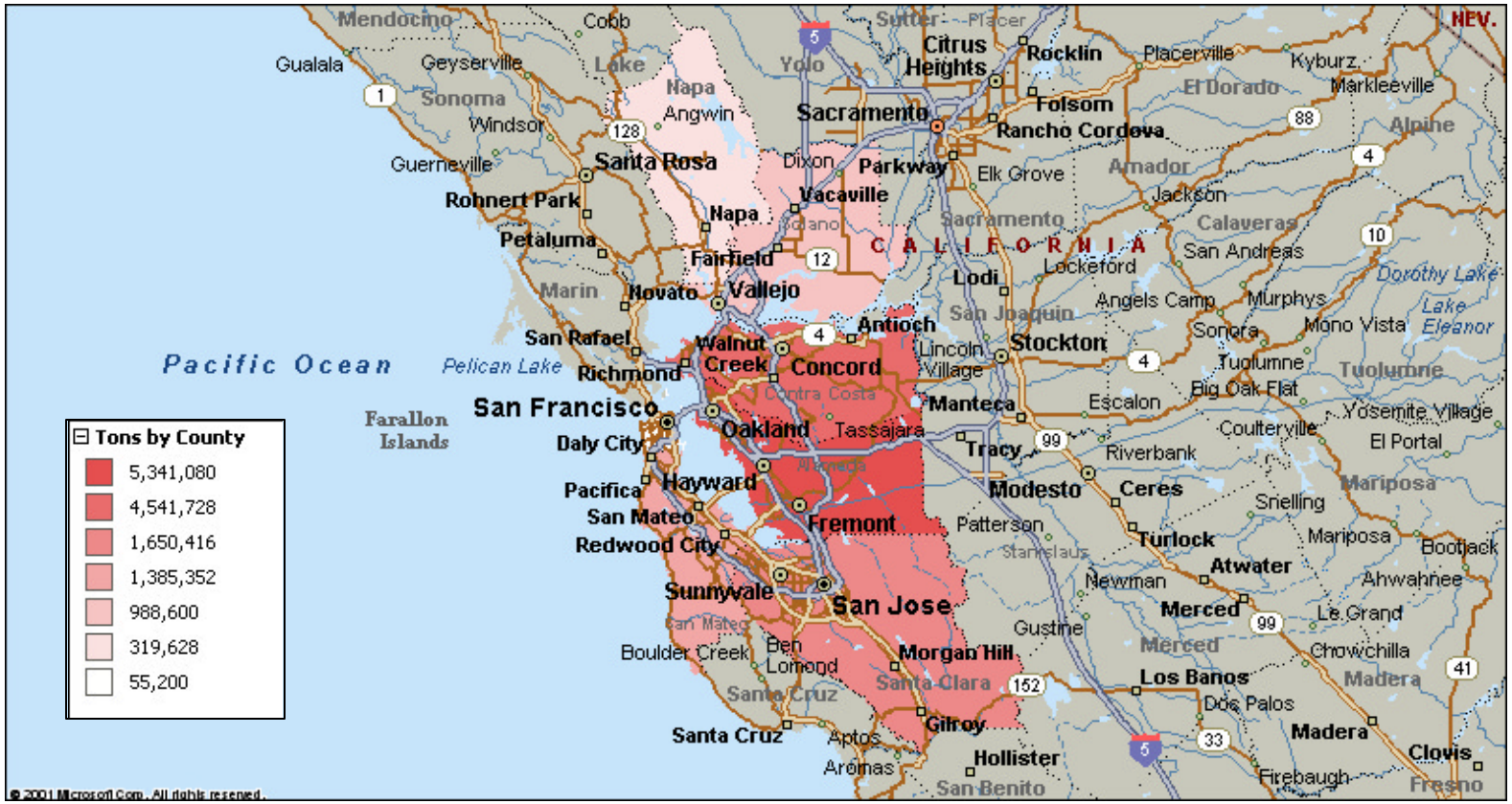
Origin States of Inbound Rail Shipments

- **Inbound shipments tend to originate in western states or move intermodally via the Chicago gateway.**



Destination Counties for Inbound Rail Shipments

- **Inbound shipments arrive mostly at carload or intermodal destinations in Alameda and Contra Costa Counties**



Inbound Rail Commodities – Overview

1999 Inbound Bay Area Rail Freight Commodities							
Commodity	**Carload Tons**	**Carload Share**	**Intermodal Tons**	**Intermodal Share**	**Total Tons**	**Share of Total**	**Cumulative Share**
Misc. Mixed Shipments	-	0%	3,276,360	100%	3,276,360	23%	23%
Crushed Stone	1,829,684	100%	-	0%	1,829,684	13%	36%
Steel Products	1,580,292	98%	32,360	2%	1,612,652	11%	47%
Motor Vehicles	1,077,404	94%	64,000	6%	1,141,404	8%	55%
Petroleum Products	528,784	100%	1,680	0%	530,464	4%	59%
Chemicals	509,100	97%	14,720	3%	523,820	4%	63%
Lumber	439,720	98%	8,080	2%	447,800	3%	66%
Paperboard	438,360	100%	-	0%	438,360	3%	69%
Meat & Poultry	260,040	72%	99,520	28%	359,560	3%	71%
Freight Forwarder Shipments	3,360	1%	315,620	99%	318,980	2%	73%
Empty Trailers	-	0%	298,200	100%	298,200	2%	76%
Cement	251,280	100%	-	0%	251,280	2%	77%
Field Crops	244,848	100%	-	0%	244,848	2%	79%
Paper	219,096	90%	23,000	10%	242,096	2%	81%
Beverages	206,720	88%	27,600	12%	234,320	2%	82%
Concrete, Gypsum, & Clay Prods.	216,004	100%	880	0%	216,884	2%	84%
Misc. Mineral Products	195,644	95%	9,280	5%	204,924	1%	85%
Misc. Wood Products	185,160	99%	1,800	1%	186,960	1%	87%
Grain Products	171,440	92%	14,240	8%	185,680	1%	88%
Plastics	167,760	93%	12,640	7%	180,400	1%	89%
Mail & Express	-	0%	169,840	100%	169,840	1%	90%
All Other	947,324	69%	419,204	31%	1,366,528	10%	100%
Inbound Total	**9,472,020**	**66%**	**4,789,024**	**34%**	**14,261,044**	**100%**	**100%**

Source: 1999 Carload Waybill Sample

Inbound Carload Commodities

- **Inbound carload business is dominated by raw materials and semi-finished industrial commodities.**
- **Inbound motor vehicles are a major source of rail volume and revenue.**

1999 Inbound Bay Area Carload Freight Commodities

Commodity	Carload Tons	Share of Carload Total	Cumulative Share
Crushed Stone	1,829,684	19%	19%
Steel Products	1,580,292	17%	36%
Motor Vehicles	1,077,404	11%	47%
Petroleum Products	528,784	6%	53%
Chemicals	509,100	5%	58%
Lumber	439,720	5%	63%
Paperboard	438,360	5%	68%
Meat & Poultry	260,040	3%	70%
Cement	251,280	3%	73%
Field Crops	244,848	3%	76%
Paper	219,096	2%	78%
Concrete, Gypsum, & Clay Prods.	216,004	2%	80%
Beverages	206,720	2%	82%
Misc. Mineral Products	195,644	2%	84%
Misc. Wood Products	185,160	2%	86%
Grain Products	171,440	2%	88%
Plastics	167,760	2%	90%
All Other Carload	950,684	10%	100%
Inbound Total	**9,472,020**	**100%**	**100%**

Source: 1999 Carload Waybill Sample

Inbound Intermodal Commodities

- **Inbound Intermodal business is dominated by domestic and *export* consumer and industrial goods, mostly shipped under generic commodity descriptions.**

1999 Inbound Bay Area Intermodal Freight Commodities

Commodity	Intermodal Tons	Share of Intermodal Total	Cumulative Share
Misc. Mixed Shipments	3,276,360	68%	68%
Freight Forwarder Shipments	315,620	7%	75%
Empty Trailers	298,200	6%	81%
Mail & Express	169,840	4%	85%
Meat & Poultry	99,520	2%	87%
Motor Vehicles	64,000	1%	88%
Misc. Chemicals	61,080	1%	89%
Small Packaged Freight	35,960	1%	90%
All Other Intermodal	468,444	10%	100%
Inbound Total	**4,789,024**	**100%**	**100%**

Source: 1999 Carload Waybill Sample

Outbound Rail Commodities

1999 Outbound Bay Area Rail Freight Commodities

Commodity	Carload Tons	Carload Share	Intermodal Tons	Intermodal Share	Total Tons	Share of Total	Cumulative Share
Misc. Mixed Shipments	-	0%	1,746,820	100%	1,746,820	25%	25%
Steel Products	907,426	100%	3,440	0%	910,866	13%	38%
Waste & Scrap	509,172	70%	215,872	30%	725,044	10%	48%
Petroleum Products	533,420	97%	18,360	3%	551,780	8%	56%
Beverages	197,160	36%	345,400	64%	542,560	8%	64%
Motor Vehicles	398,080	97%	12,000	3%	410,080	6%	70%
Misc. Pet. Products	281,396	100%	-	0%	281,396	4%	74%
Chemicals	252,004	98%	5,400	2%	257,404	4%	78%
Sugar	67,040	40%	102,280	60%	169,320	2%	80%
Paperboard	150,760	97%	4,520	3%	155,280	2%	82%
Bauxite & Other Ores	120,624	100%	-	0%	120,624	2%	84%
Mail & Express	-	0%	99,360	100%	99,360	1%	86%
Misc. Foods	58,640	63%	34,400	37%	93,040	1%	87%
Misc. Freight	80,880	94%	5,600	6%	86,480	1%	88%
Canned & Frozen Foods	57,400	67%	27,720	33%	85,120	1%	89%
Misc. Chemicals	76,600	98%	1,280	2%	77,880	1%	90%
All Other Commodities	344,996	52%	323,672	48%	668,668	10%	100%
Total	**4,035,598**	**58%**	**2,946,124**	**42%**	**6,981,722**	**100%**	**100%**

Outbound Carload Commodities

- **Outbound carload commodities are, like the inbound business, largely raw materials and semi-finished industrial goods.**
- **Motor vehicles are an important traffic source in both directions.**

1999 Outbound Bay Area Carload Freight Commodities

Commodity	Carload Tons	Share of Carload Total	Cumulative Share
Steel Products	907,426	22%	22%
Petroleum Products	533,420	13%	36%
Waste & Scrap	509,172	13%	48%
Motor Vehicles	398,080	10%	58%
Misc. Pet. Products	281,396	7%	65%
Chemicals	252,004	6%	71%
Beverages	197,160	5%	76%
Paperboard	150,760	4%	80%
Bauxite & Other Ores	120,624	3%	83%
Misc. Freight	80,880	2%	85%
Misc. Chemicals	76,600	2%	87%
Sugar	67,040	2%	89%
Cement	63,808	2%	90%
All Other Carload	397,228	10%	100%
Total	**4,035,598**	**100%**	**100%**

Source: 1999 Carload Waybill Sample

Outbound Intermodal Commodities

- **Outbound Intermodal business is dominated by domestic and *import* consumer and industrial goods, mostly shipped under generic commodity descriptions.**

1999 Outbound Bay Area Intermodal Freight Commodities

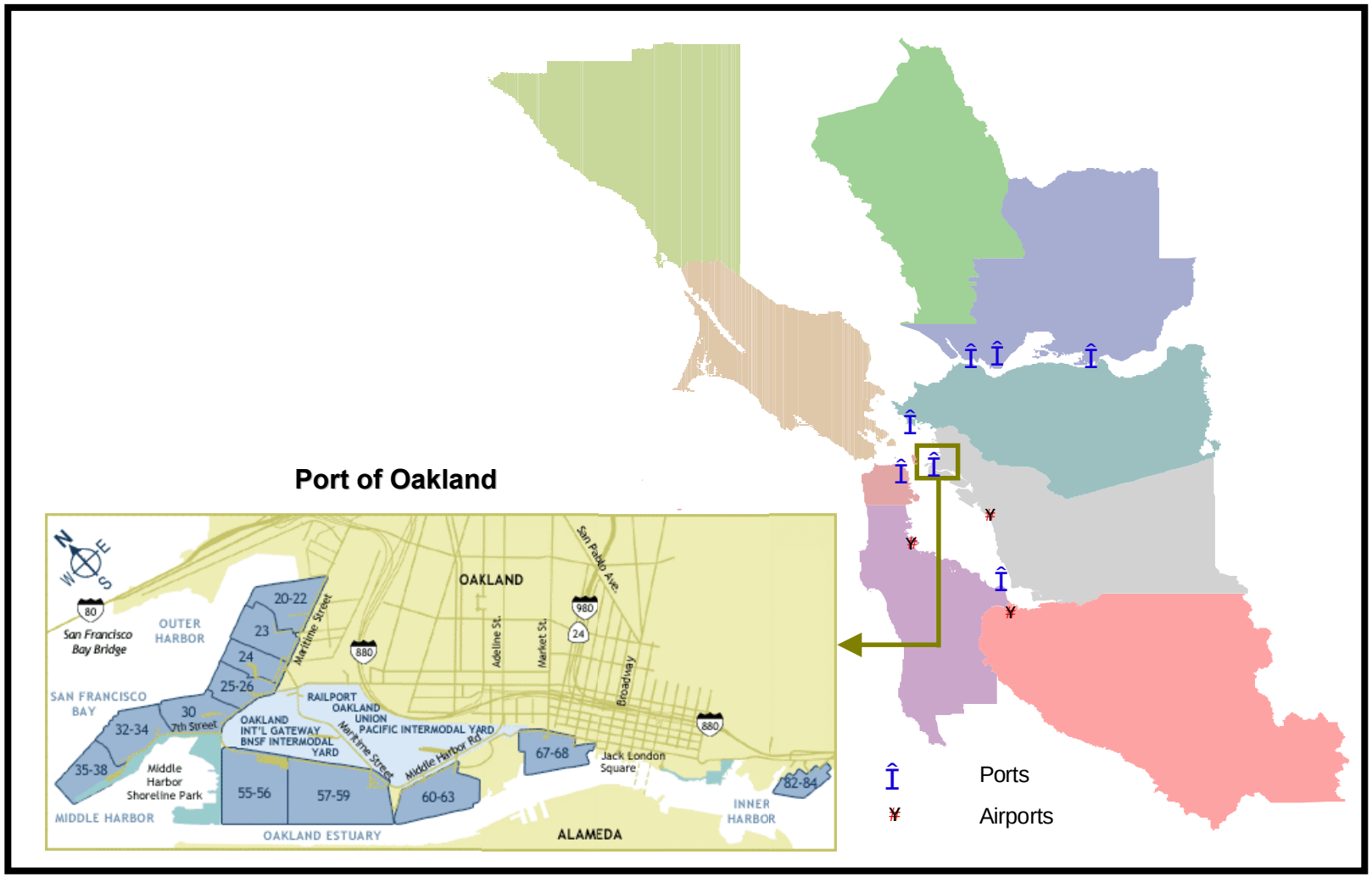
Commodity	Intermodal Tons	Share of Intermodal Total	Cumulative Share
Misc. Mixed Shipments	1,746,820	59%	59%
Beverages	345,400	12%	71%
Waste & Scrap	215,872	7%	78%
Sugar	102,280	3%	82%
Mail & Express	99,360	3%	85%
Empty Trailers	54,680	2%	87%
Paper	52,080	2%	89%
Freight Forwarder Shipments	37,840	1%	90%
All Other Intermodal	291,792	10%	100%
Total	**2,946,124**	**100%**	**100%**

Source: 1999 Carload Waybill Sample

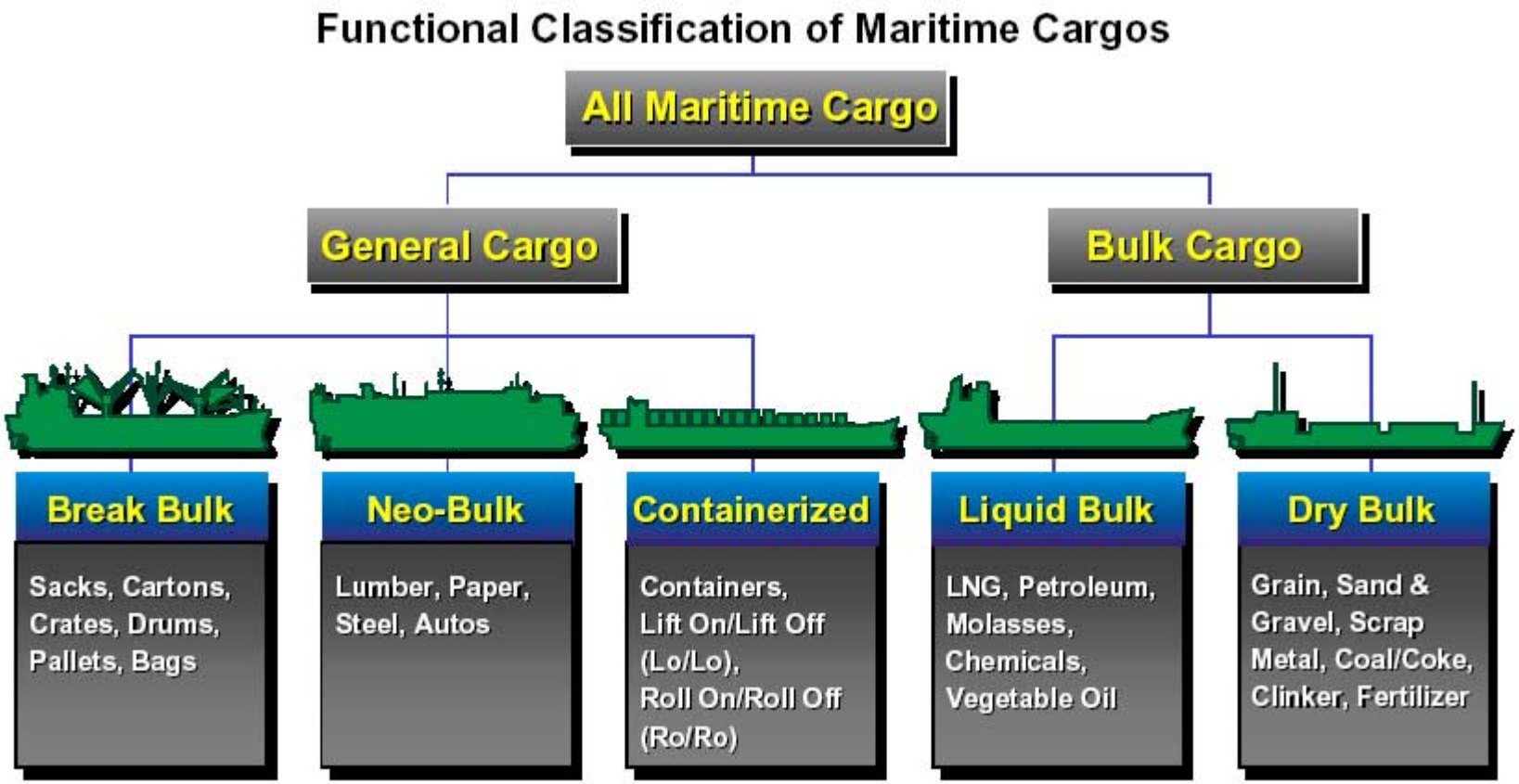
California-Based Rail Flows

Source: FHWA Freight Analysis Framework

Marine and International Air Port Facilities in Bay Area



Maritime Cargo



Year 2002 Total Revenue Tonnage

TOTAL REVENUE TONNAGE

NORTHERN CALIFORNIA	Total	% of Coast	Chg from 2001	% Loaded: % Discharged
San Francisco	1,166,037	0.4%	166.9%	18.8: 81.2
Redwood City	349,216	0.1	-14.1	0.0: 100.0
Oakland	20,432,958	7.8	-0.2	57.9: 42.1
Richmond	51,041	<0.1	-72.7	0.0: 100.0
Crockett	766,322	0.3	13.5	0.0: 100.0
Pittsburg	360,497	0.1	126.0	95.6: 4.4
Stockton	1,925,896	0.7	-2.9	36.1: 63.9
Sacramento	608,458	0.2	-11.6	55.3: 44.7
Benicia	831,115	0.3	-5.9	15.4: 84.6
Eureka	372,286	0.1	-18.0	66.1: 33.9
AREA TOTAL	26,863,826	10.2%	1.9%	51.4: 48.6

GENERAL CARGO

	Total	% of Coast	Chg from 2001	% Loaded: % Discharged
San Francisco	64,820	0.7%	913.9%	1.3: 98.7
Redwood City	-			
Oakland	97,242	1.1	-80.6	30.7: 69.3
Richmond	48,707	0.5	-73.8	0.0: 100.0
Crockett	-			
Pittsburg	-			
Stockton	380,636	4.2	138.6	67.0: 33.0
Sacramento	196,993	2.2	-14.9	65.7: 34.3
Benicia	-			
Eureka	184,777	2.0	5.7	100.0: 0.0
AREA TOTAL	973,175	10.7%	-23.5%	61.6: 38.4

AUTOMOBILES AND TRUCKS

	Total	% of Coast	Chg from 2001	% Loaded: % Discharged
San Francisco	114	<0.1%	--	100.0: 0.0
Redwood City	-			
Oakland	738,609	3.5	-5.1%	73.3: 26.7
Richmond	-			
Crockett	-			
Pittsburg	-			
Stockton	-			
Sacramento	-			
Benicia	713,185	3.4	22.4	1.4: 98.6
Eureka	-			
AREA TOTAL	1,451,908	6.9%	6.6%	38.0: 62.0

CONTAINERS

	Total (TEUs)	% of Coast	Chg from 2001	% Loaded: % Discharged
San Francisco	19,095	0.2%	-17.2%	33.8: 66.2
Redwood City	-			
Oakland	1,152,771	10.7	2.4	57.5: 42.5
Richmond	74	<0.1	957.1	0.0: 100.0
Crockett	-			
Pittsburg	1,501	<0.1	-	38.0: 62.0
Stockton	29	<0.1	222.2	0.0: 100.0
Sacramento	42	<0.1	100.0	0.0: 100.0
Benicia	-			
Eureka	-			
AREA TOTAL	1,173,512	10.8%	2.2%	57.1: 42.9

LUMBER & LOGS

	Total	% of Coast	Chg from 2001	% Loaded: % Discharged
San Francisco	4,583	0.2%	--	0.0: 100.0
Redwood City	-			
Oakland	-			
Richmond	1,076	0.1	4.3%	0.0: 100.0
Crockett	-			
Pittsburg	-			
Stockton	141	<0.1	--	0.0: 100.0
Sacramento	58,956	3.0	41.8	0.0: 100.0
Benicia	-			
Eureka	124,913	6.4	-2.8	0.7: 99.3
AREA TOTAL	189,669	9.8%	10.0%	0.5: 99.5

BULK CARGO

	Total	% of Coast	Chg from 2001	% Loaded: % Discharged
San Francisco	771,905	1.6%	*	14.1: 85.9
Redwood City	349,216	0.7	-14.1%	0.0: 100.0
Oakland	-			
Richmond	-			
Crockett	766,322	1.6	13.5	0.0: 100.0
Pittsburg	334,980	0.7	110.0	100.0: 0.0
Stockton	1,544,626	3.3	-15.3	28.5: 71.5
Sacramento	351,795	0.8	-15.2	58.9: 41.1
Benicia	117,930	0.3	-58.9	100.0: 0.0
Eureka	62,596	-	-58.4	96.4: 3.6
AREA TOTAL	4,299,370	9.2%	6.9%	29.5: 70.5

Note: Containers are expressed in TEUs so tonnage by commodity would not add up

Source: PMA 2002 Annual Report

Port of Oakland vs. West Coast

	2002		2001		2000		1999		1998	
	TEUs/Tons	Percent of Coast	TEUs/Tons	Percent of Coast	TEUs/Tons	Percent of Coast	TEUs/Tons	Percent of Coast	TEUs/Tons	Percent of Coast
OAKLAND										
Container TEUs	1,152,771	10.7%	1,125,471	11.1%	1,188,134	11.6%	1,130,862	12.3%	1,058,022	12.5%
General Cargo	97,242	1.1%	500,548	5.2%	294,589	3.0%	310,604	3.1%	417,108	4.3%
Lumber & Logs	-	-	1,283	0.1%	15	-	-	-	-	-
Autos & Trucks	738,609	3.5%	778,691	4.0%	952,443	4.8%	768,711	4.4%	688,741	4.6%
Bulk Cargo	-	-	66,306	0.1%	-	-	65,644	0.1%	36,792	0.1%
Port Total	20,432,958	7.8%	20,479,835	8.1%	21,445,325	8.3%	20,369,613	8.5%	19,129,015	8.7%
COAST TOTALS										
Container TEUs	10,823,126		10,101,589		10,237,519		9,208,553		8,444,004	
General Cargo	9,124,394		9,596,293		9,953,279		10,010,412		9,719,501	
Lumber & Logs	1,941,063		1,851,419		2,116,780		2,005,755		2,071,769	
Autos & Trucks	21,060,564		19,288,262		19,720,596		17,570,694		14,944,308	
Bulk Cargo	46,910,719		50,914,801		53,874,796		53,456,900		49,101,074	
Port Total	263,029,882		253,377,788		259,703,274		239,589,162		219,384,720	

Source: PMA 2002 Annual Report

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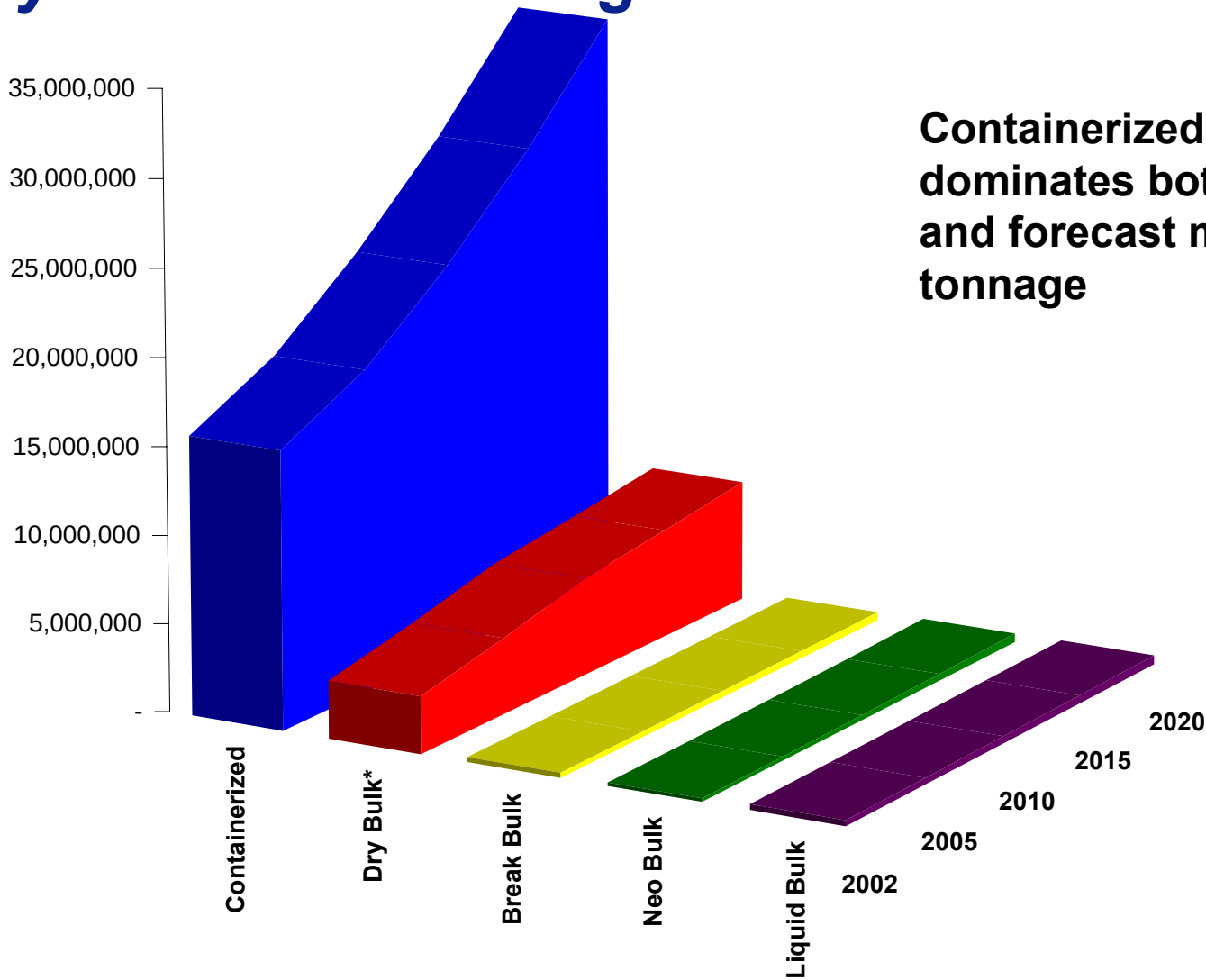
Bay Area Maritime Tonnage Forecast

Commodity Group	Forecast Tonnage (metric tons) 2002	2005	2010	2015	2020	Compounded Annual Growth Rates 2002 to 2005	2005 to 2010	2010 to 2020	2002 to 2020
Containerized	15,799,012	18,282,000	22,227,000	26,956,000	32,567,000	5%	4%	4%	4%
Dry Bulk*	3,265,506	4,312,731	5,529,081	6,141,336	6,821,390	10%	5%	2%	4%
Break Bulk	285,100	310,183	356,988	410,856	472,851	3%	3%	3%	3%
Neo Bulk	195,000	227,908	295,553	383,275	497,035	5%	5%	5%	5%
Liquid Bulk	331,045	356,289	402,713	455,185	514,494	2%	2%	2%	2%

* Does not include bay sand harvest
Source: BCDC Seaport Plan

- **Bay Area maritime tonnage includes:**
  - **Containerized cargo handled at Oakland and San Francisco.**
  - **Bulk cargoes handled at San Francisco, Richmond, Redwood City, and Benicia.**
  - **Crude petroleum, petroleum products, raw sugar, and bay sand handled at private terminals.**

Bay Area Port Tonnage Forecast



Containerized cargo dominates both current and forecast maritime tonnage

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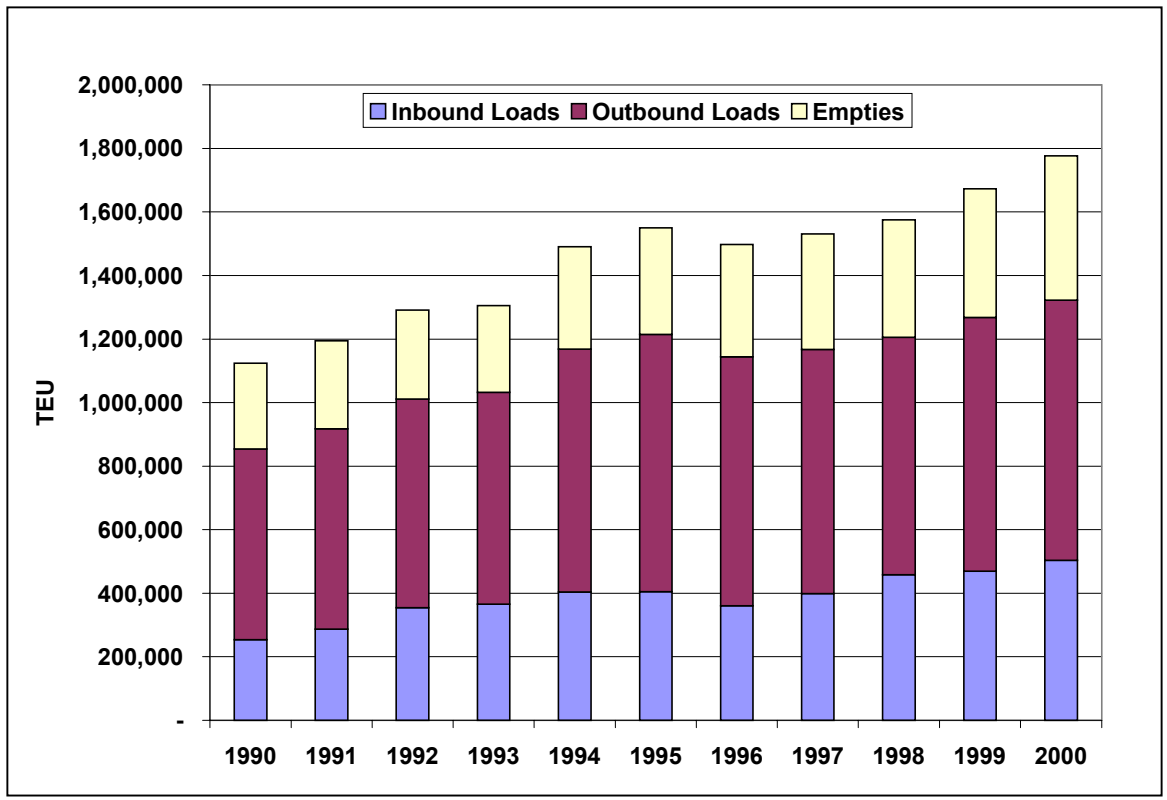
Oakland Containerized Cargo Growth

- Oakland is an export port, unlike Long Beach and Los Angeles where exports are only about half of the import volume.

- Over the ten-year period shown, overall containerized cargo growth average 5% annually. Import loads grew fastest, at 7%, while export loads grew at 3% and empties at 5%.



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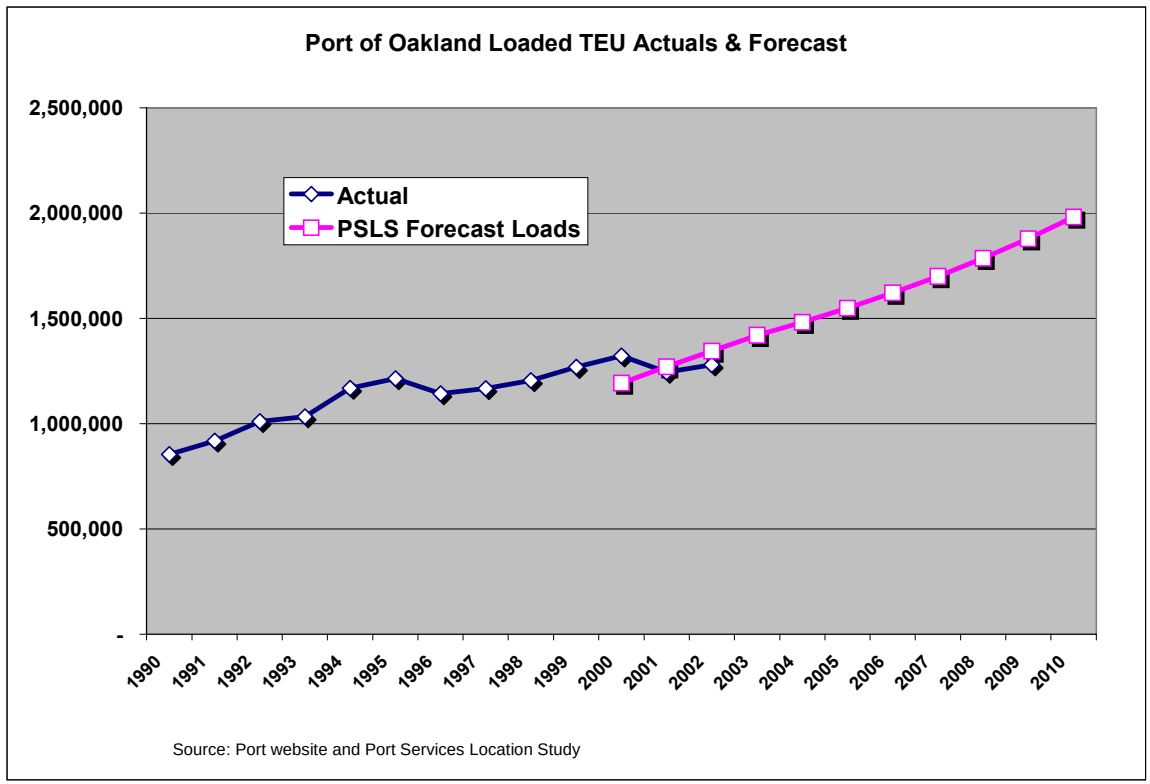
Oakland Container Cargo Forecasts

- **The most recent TEU forecast calls for 5% compound average annual growth through 2020.**
- **That forecast appears reasonable for the near term (especially given the twin impacts of the terrorist attacks and the economic downturn).**



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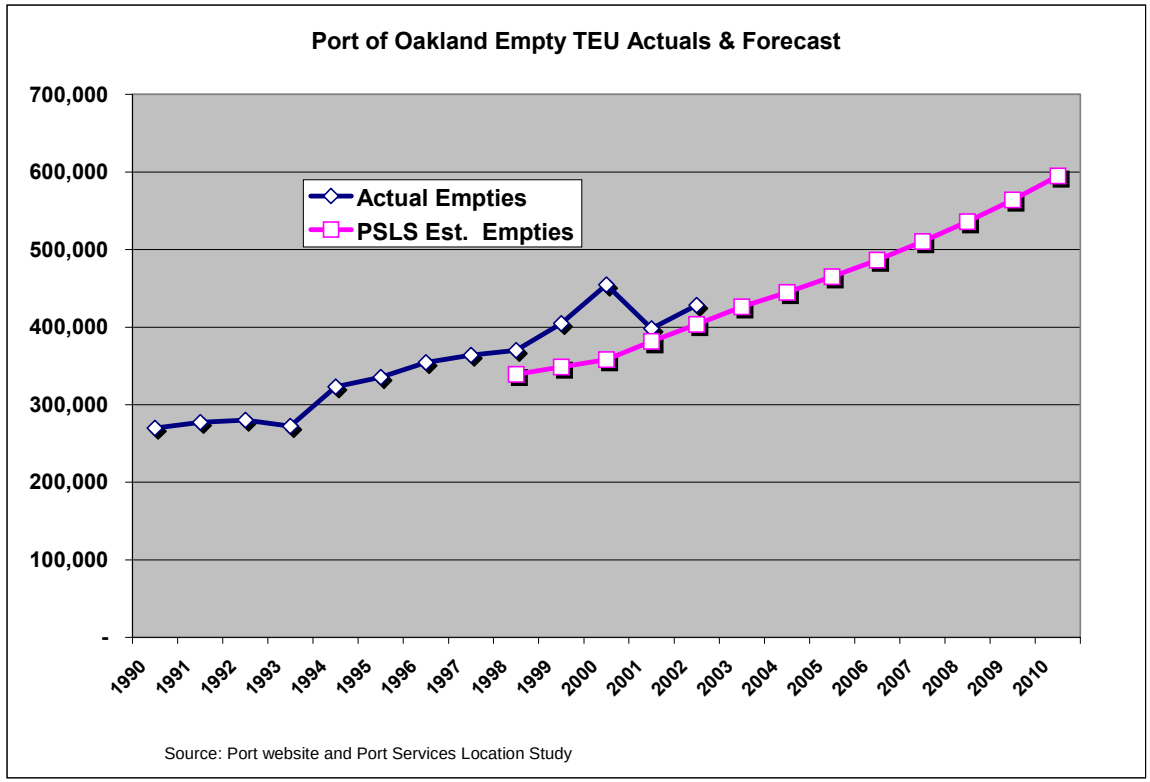
Oakland Empty Container Forecast

- **The Port Services Location Study used historical data indicating that empties had averaged 30% of loads, and projected empties at the same proportion.**

- **The reported empty proportion has been rising, however, and in 2002 was about 33%.**



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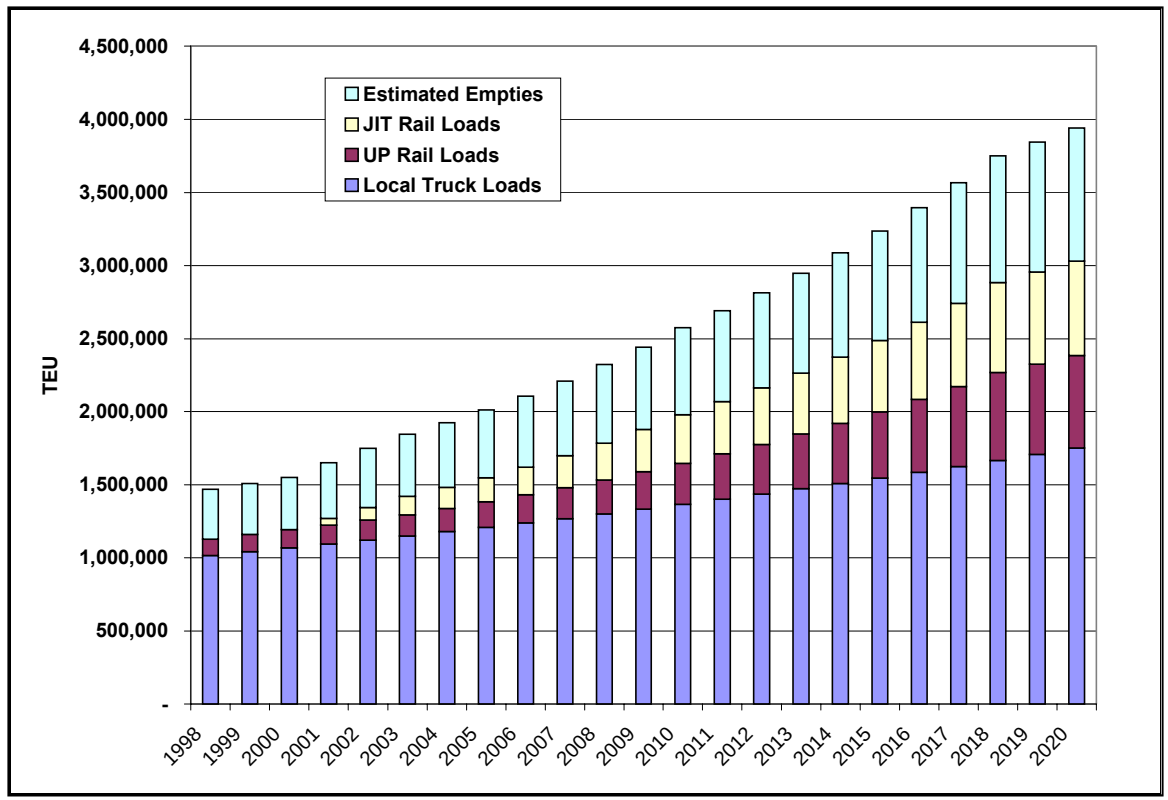
Oakland Container Movement Forecasts

- Adding the loaded and empty forecasts and converting TEU to container volumes yields a total Port of Oakland container movement forecast.
- Rail drayage traffic between marine terminals and either the UP or JIT rail facilities is expected to grow faster than over-the-road trucking.



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Bulk Tonnage History

Seaport Bulk Tonnage Reported to BCDC - Metric Tons

Cargo Type	1994	1995	1996	1997	1998	1999	2000	2001	2002 est.
Break Bulk	48,577	45,674	30,908	35,961	77,801	76,753	78,541	21,027	40,127
Neo-Bulk*	1,280,060	1,032,053	840,922	759,012	945,299	576,281	559,045	591,961	381,973
Dry Bulk	1,190,360	1,488,256	2,083,713	2,222,153	2,293,782	2,041,251	2,551,717	2,643,818	3,323,506
Liquid Bulk	443,742	463,733	471,584	530,526	444,771	653,566	492,727	335,499	331,045
Total Bulk	2,964,733	3,031,711	3,429,123	3,549,649	3,763,651	3,349,850	3,684,030	3,594,306	4,076,651

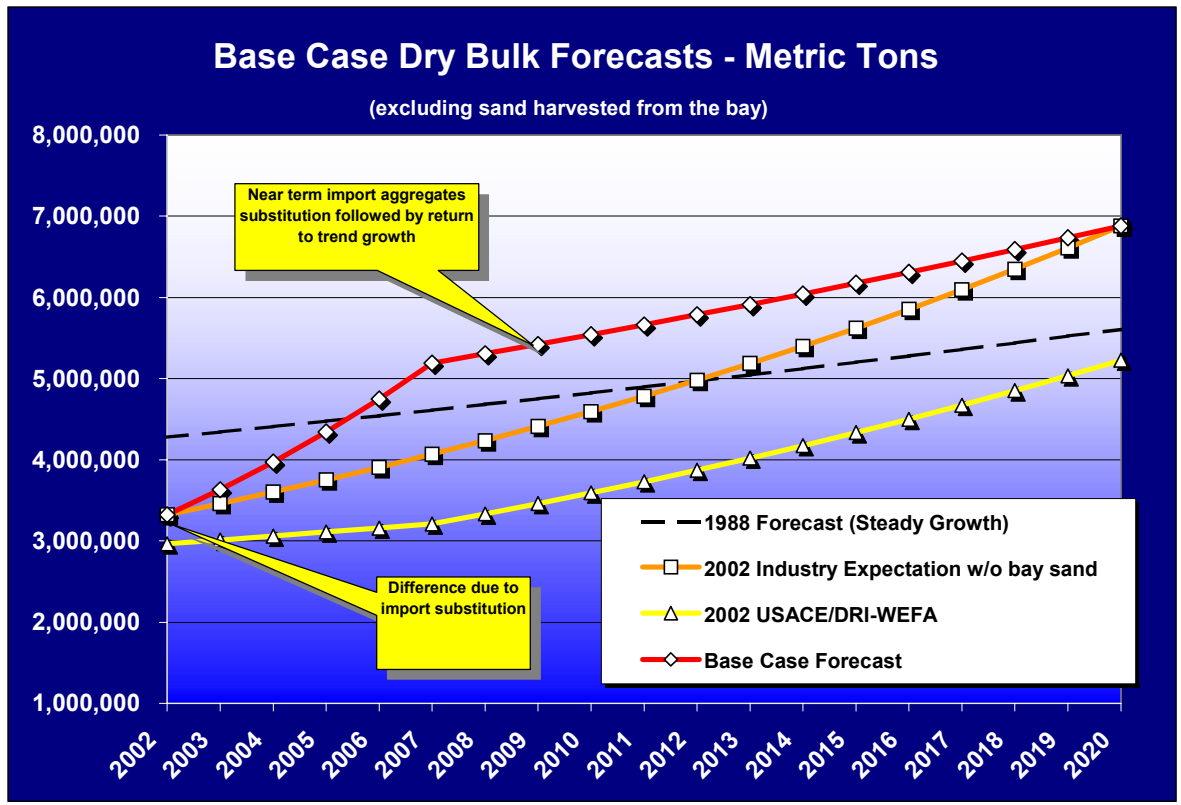
*BCDC data classify newsprint and steel as neo-bulk as well as autos

- **Break bulk cargo data reflect the volatility of individual cargo flows.**
- **The decline in neo-bulk tonnage is due to substitution of containerized parts flows for auto brands formerly imported as finished vehicles.**
- **The dry bulk tonnage has grown with Bay Area construction activity and import substitution for declining local production.**
- **The liquid bulk tonnage decline appears to be caused by reductions in shipments of petroleum products through non-refinery terminals.**

Dry Bulk Cargo Forecast

- Dry bulk accounts for the vast majority of non-containerized, non-refinery cargo in the Bay Area.

- The base case forecast calls for rapid growth for 2002-2007, and slower growth for 2007-2020. This forecast is consistent with a near term increase due to domestic supply depletion and a longer-term return to regional trends.



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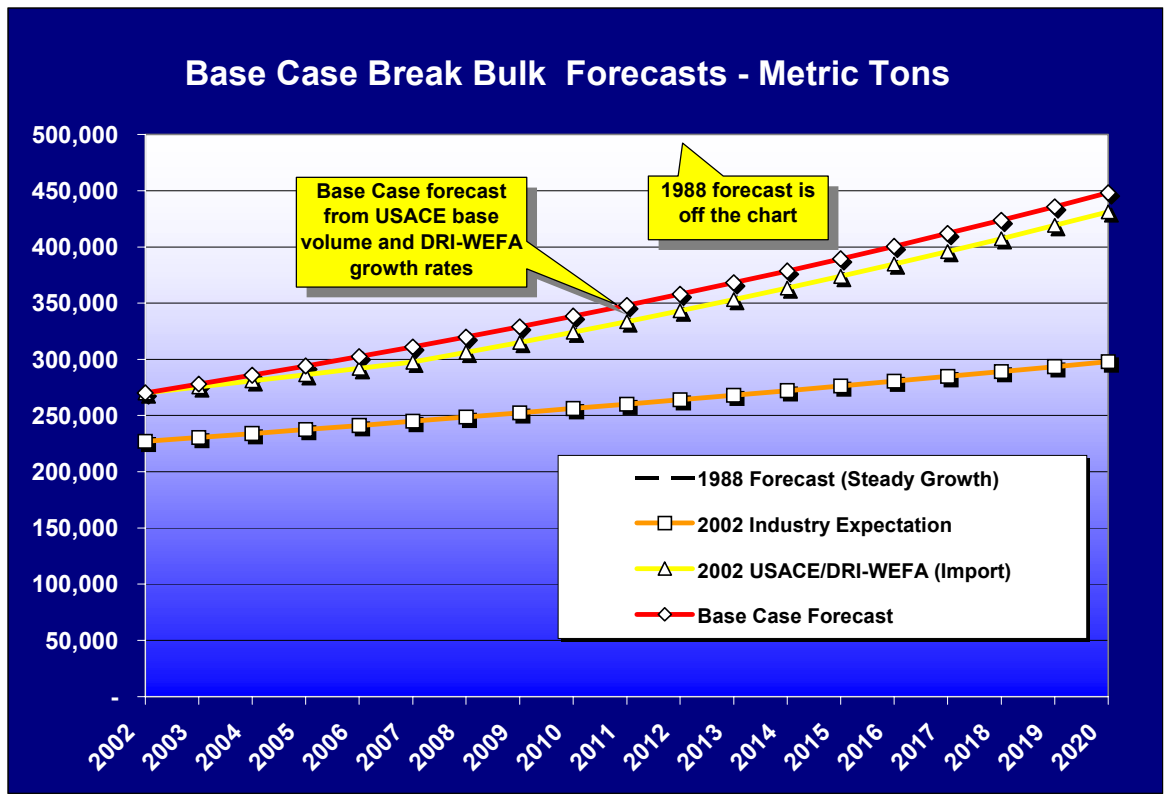
Break Bulk Cargo Forecast

- The only true break bulk cargoes left in the Bay Area are imports of forest products, steel, newsprint, and project cargo at the ports of Richmond and San Francisco.

- The base case forecast starts from year 2002 totals implied by industry data and incorporates west coast growth rates projected by Global Insights.



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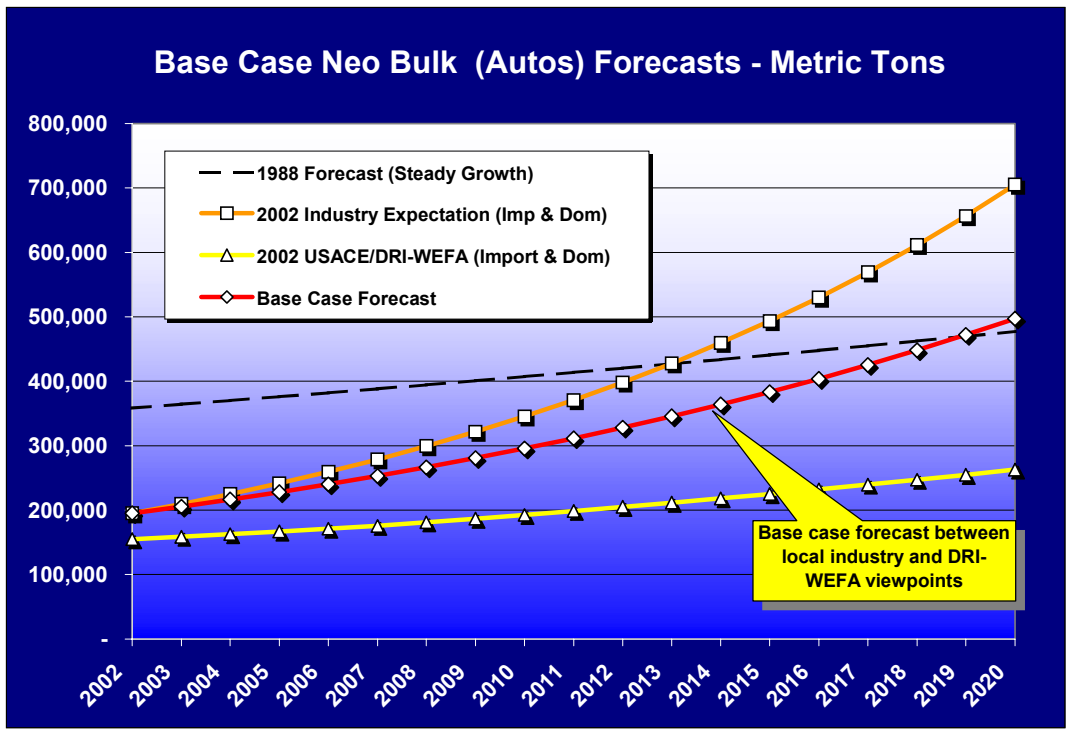
Neo-Bulk (Autos) Cargo Forecast

- **Earlier forecasts did not anticipate the widespread establishment of North American assembly plants for foreign autos.**

- **Industry volumes are based on the potential for the Benicia and Richmond facilities, and the Matson domestic volume. While the is a potential upside to the forecast, several factors suggest a a growth rate midway between the industry and Global Insights rates.**



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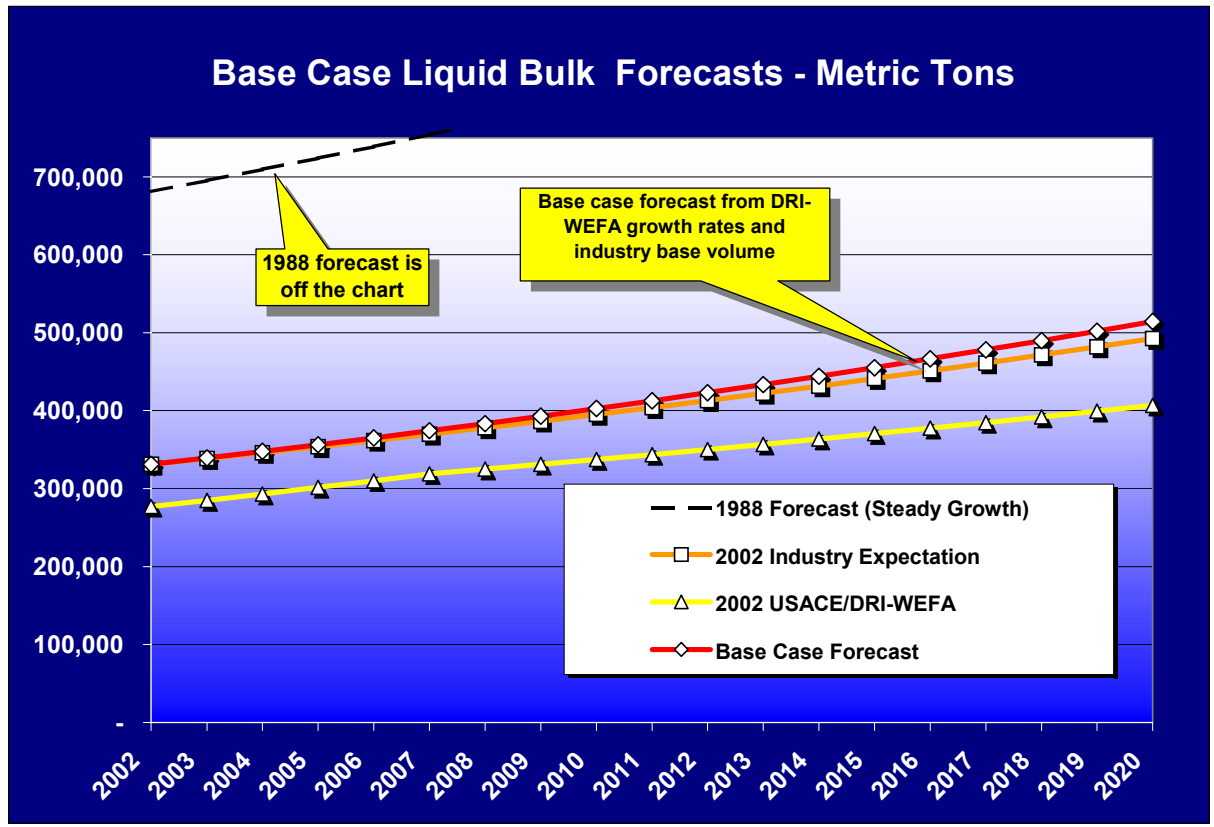
Liquid Bulk Cargo Forecast

- **The only non-refinery liquid bulk commodities are exported tallow and imported/exported vegetable oils, both at specialized terminals.**
- **The base case forecast uses a Global Insights West Coast growth rate, acknowledging the existence of potential demand that may not be met by existing facilities.**



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Truck Portion of Bay Area Maritime Cargo

Source: FHWA Freight Analysis Framework

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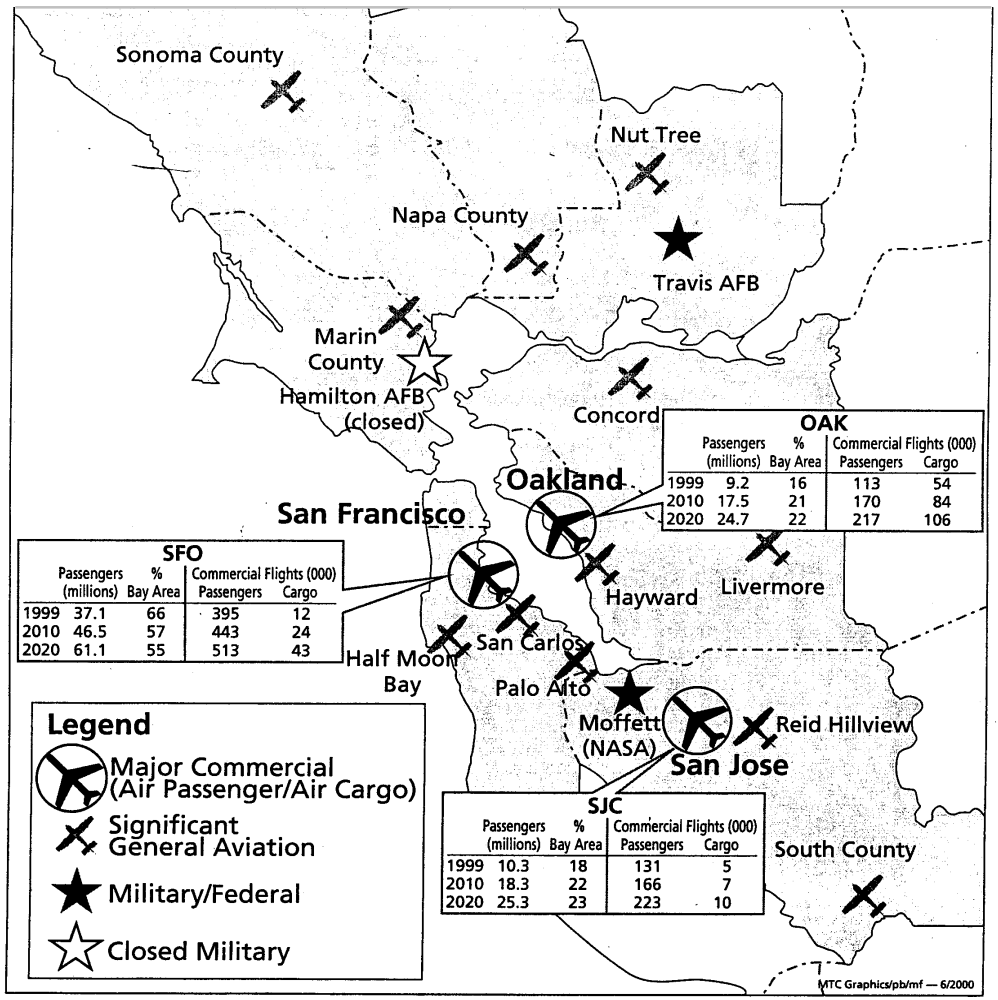
Air Ports
Major Growth Planned with Capacity Complications

- The attraction of air cargo service is speed and reliability
  - This is particularly true for intercontinental service
  - Much continental service is provided by truck as a substitute for air
  - But it is expensive on a cost per unit basis
  - Hence, nationally, air cargo is less than 1% of all freight by tonnage
- There are three commercial airports in MTC region: OAK, SJC, SFO
- The primary source of data and forecasts is the "Regional Airport Systems Plan – Update 2000" with cargo forecasts for 2010 and 2020
  - Cargo tonnage will grow faster than it has historically
  - Volume will triple
  - All cargo flights will increase 125%
- There are significant capacity issues unique to each airport
  - OAK: additional runways by 2005-8, space for support facilities
  - SJC: land locked; very limited space in narrow body passenger aircraft
  - SFO: additional runways now; air traffic interference now, space for additional support facilities

Bay Area Air Ports

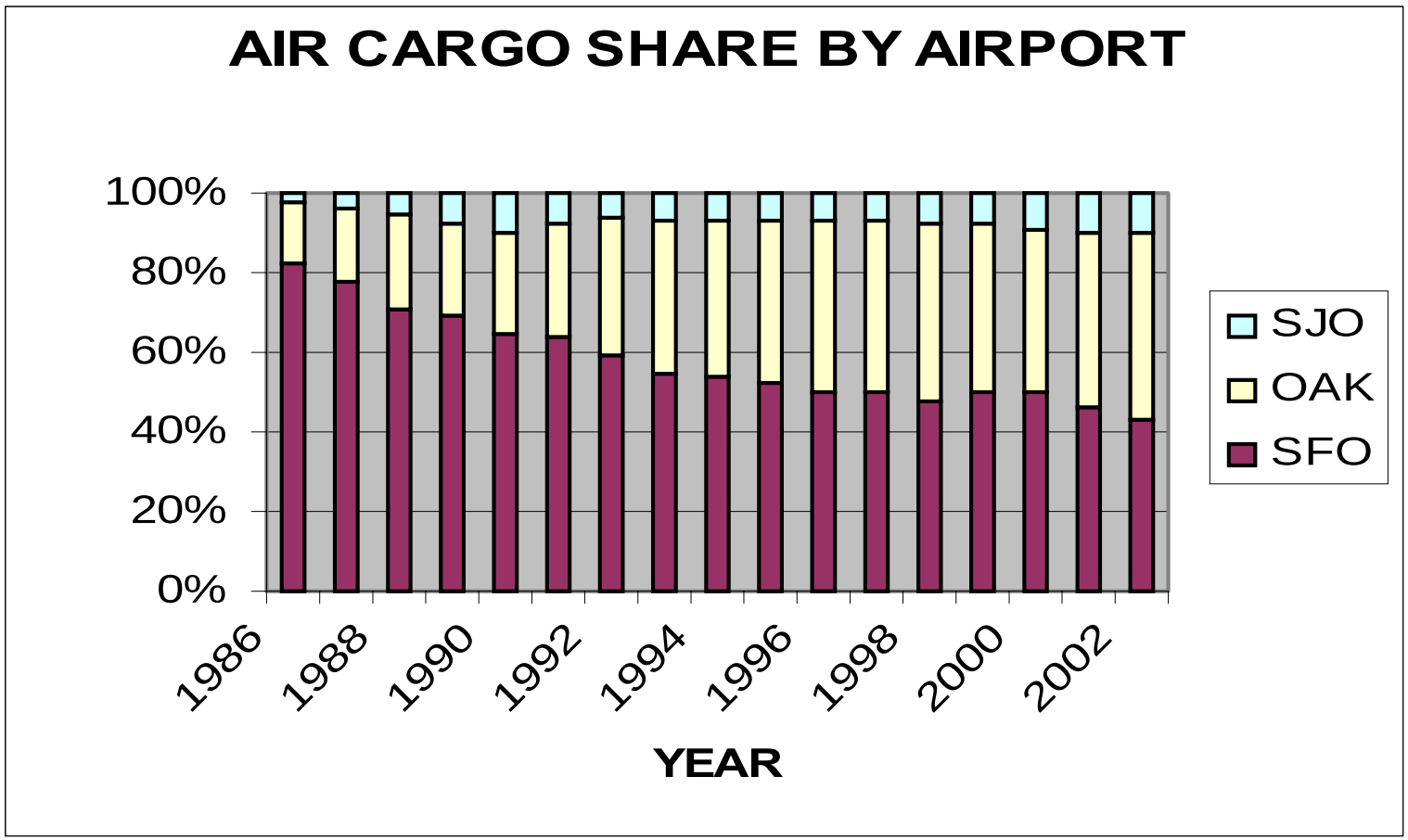


Of 17 active Bay Area airports, three handle commercial cargo; growth is expected at each; count of all-cargo flights shows greatest CAAG at SFO but OAK has many more flights

Local Issues/Implications

- **Data is very limited, misleading, commercially sensitive, and not directly applicable to MTC considerations**
  - **Landed/lifted weights and number of all-cargo flights are public info, but**
    - Landed and lifted weights are not actual tonnage landed and lifted, and
    - Much air cargo comes and goes via truck substituted for air service
  - **Recent difficulties in the airline industry and changes in the way USPS handles its air service have significantly changed conditions; data does not reflect this**
  - **Only OAK is known to have a survey of trip counts in/out**
- **These three airports are significant truck trip generators**
  - **Which trips generally aggravate existing congestion**
  - **OAK appears to be poised for a significant increase in volume**

OAK has been gaining share in addition to volume



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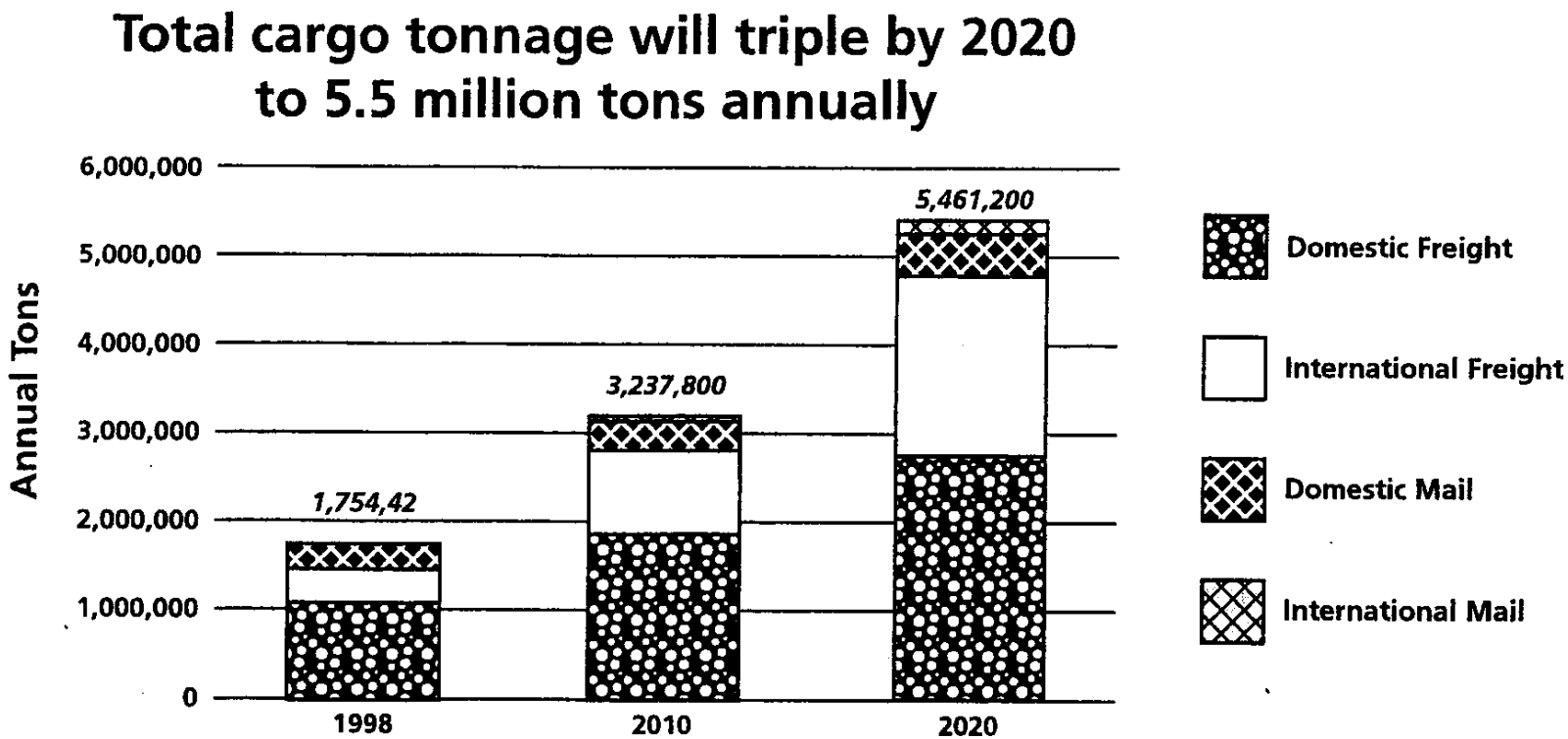
Bay Area air cargo forecasts growth by segment



data not available for each airport

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